Oil India Limited
(A Govt. Of India Enterprise)

P.O. DULIAJAN 786 602
DIST. DIBRUGARH
ASSAM , INDIA
FAX : 91 374 2800533
EMAIL : material@oilindia.in
WEBSITE : www.oil-india.com

TENDER NO. : **SDG9009P11/07**

TENDER FEE : Rs. 4,500.00 OR US$ 100.00

DATE OF PRE-BID CONFERENCE : **23/09/2010 & 24/09/2010**

VENUE OF PRE-BID CONFERENCE : KOLKATA (INDIA)

PERFORMANCE SECURITY : APPLICABLE

OIL INDIA LIMITED invites Global Tenders for the item detailed below:

Srl. No.	Material Description	Unit	Qty
1	SUPPLY & COMMISSIONING OF 750 HP MOBILE DRILLING RIG (DETAILED SPECIFICATION HAS BEEN FURNISHED VIDE ANNEXURE – A)	NO	1

N O T E S :

1.0 A Pre-Bid Conference with the Parties will be held in Kolkata (India) on 23rd September & 24th September, 2010 to discuss on the technical specifications and other terms and conditions of the tender. All the Parties who purchase the Tender Documents within the closing date of sale of tender will be eligible to attend the Pre-Bid Conference. The exact venue and time of the Pre-Bid conference will be intimated to the Parties at a later date.

2.0 Clarification on the technical specifications and other terms & conditions of the Rig Packages shall be provided to the parties during the Pre-bid Conference. Parties should come fully prepared to the Pre-bid Conference and submit their queries to OIL in the Pre-bid Conference for clarification. The set of queries may also be sent to OIL at least 7 (seven) days before the Pre-bid Conference for study by OIL.

Contd….2

3.0 Any changes in the technical specifications and other terms & conditions of the Rig Packages arising out of discussion in the Pre-bid Conference shall also form part of the tender document.

4.0 Parties, immediately after the purchase of the Tender documents, shall inform OIL at the following address about their participation in the Pre-Bid Conference with details of the persons to enable OIL to make arrangement for the Pre-Bid Conference.

HEAD - MATERIALS
OIL INDIA LIMITED
P.O DULIAJAN, PIN – 786 602
DIST. DIBRUGARH (ASSAM) INDIA
FAX NO. : 91 - 374 - 2800533
E-Mail : matmmfd@oilindia.in
material@oilindia.in

Special Notes:

1.0 The tender will be governed by "General Terms & Conditions" for e-Procurement as per Booklet NO. MM/GLOBAL/E-01/2005 for E-procurement (ICB Tenders) and its amendments.

2.0 Bid Rejection Criteria / Bid Evaluation Criteria is furnished vide Annexure-B of tender document.

3.0 Technical Check list and Commercial Check list are furnished vide Annexure – A1 & C. Please ensure that both the check lists are properly filled up and uploaded along with Technical bid.

4.0 The item qualifies for Nil duty / Deemed Export benifits. For Deemed Export benefits, please refer Addendum to the General terms and conditions for Global tender.

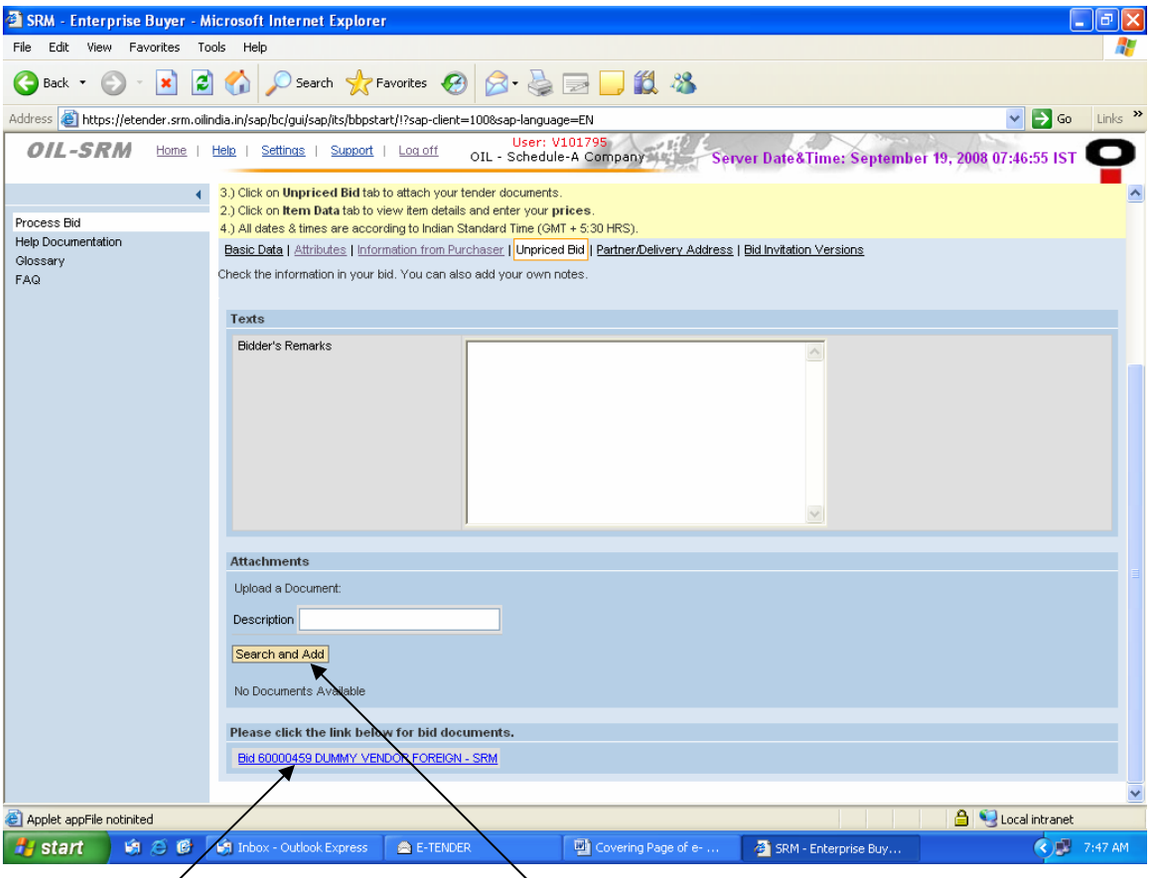
5.0 Please note that all tender forms and supporting documents are to be submitted through OIL's e-Procurement site only except following documents which are to be submitted manually in sealed envelope super scribed with tender no. and due date to The **Head Materials, Materials Department, Oil India Limited, Duliajan- 786602, Assam** on or before the Bid Closing Date and Time mentioned in the Tender.

a) **Original Bid Security .**

b) **Details Catalogue and any other document which have been specified to be submitted in original.**

Contd….3

6.0 The tender is invited under SINGLE STAGE-TWO BID SYSTEM. The bidders are required to submit both the "TECHNICAL" and "COMMERCIAL" bids through electronic form in the OIL's e-Tender portal within the Bid Closing Date and Time stipulated in the e-Tender. Please ensure that Technical Bid / all technical related documents related to the tender are to be uploaded in the c-Folder link (collaboration link) under Un-priced Bid Tab Page only. Please note that no price details should be uploaded as c-Folder link (collaboration link) under Un-priced Bid Tab Page. Details of prices as per Bid format / Commercial bid can be uploaded as Attachment in the attachment link Search and Add **under "Unpriced Bid" under "General Data". A screen shot in this regard is given below. Offer not complying with above submission procedure will be rejected as per Bid Rejection Criteria mentioned in Annexure-B (Refer Clause 1.0 of (B) Commercial)**



C-FOLDER LINK

Details of prices as per Bid format / Commercial bid can be uploaded in this Attachment

Contd….4

7.0 OIL shall be entering into an Integrity Pact with the bidders as per format enclosed vide **Annexure - XII** of the tender document. This Integrity Pact proforma has been duly signed digitally by OIL's competent signatory. The proforma has to be returned by the bidder (along with the technical bid) duly signed (digitally) by the same signatory who signed the bid, i.e., who is duly authorized to sign the bid. Any bid not accompanied by Integrity Pact Proforma duly signed (digitally) by the bidder shall be rejected straightway. Uploading the Integrity Pact with digital signature will be construed that all pages of the Integrity Pact has been signed by the bidder's authorized signatory who sign the Bid.

(Note: Shri N. Gopalaswami, Ex-CEC and Shri R. C. Agarwal, IPS(Retd.) have been appointed as Independent External Monitors).

8.0 Bidders are requested to examine all instructions, forms, terms and specifications in the bid. Failure to furnish all information required as per the bid or submission of offers not substantially responsive to the bid in every respect will be at the bidders risk and may result in the rejection of its offer without seeking any clarifications.

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Annexure- A

SPECIFICATIONS OF SELF-PROPELLED MOBILE DRILLING RIG

SECTION 1: CARRIER

1.0 DIMENSIONS

Overall Width	-	Not more than 2.70 meters.
Overall Height	-	Not more than 5.0 meters from ground.
Length - Carrier	-	Preferably within 16.00 meters.
- Overall	-	Preferably not more than 22.00 meters (with mast).
Rear Overhang	-	Preferably not to exceed 30 % of wheelbase
Ground Clearance	-	Not less than 35.00 cm.

2.0 DRIVE & AXLE

Drive	-	As per design. However all rear axles shall have drive axles.
Max. Permissible GVW	-	As per design **(Shall not exceed 60.00 MT)**
No. of Axles	-	As per design.
Front Axle Capacity	-	As per design.
Rear Axle Capacity	-	As per design.
Front Axle Loading	-	Preferably not to exceed 10.00 MT per axle.
Rear Axle Loading	-	Preferably not to exceed 13.00 MT per axle.

All drive axles shall have Inter Axle Lock and Differential Lock facilities.

Individual Load on each axle (all front and rear) shall be within 85% (Eighty Five percent) of maximum loading Capacity of the respective axle.

i.e Total Weight (Laden Weight) of the unit with all items including mast shall be within 85% (Eighty Five percent) of Maximum Permissible Gross Vehicle Weight (i.e. Total Axle Capacity) of the unit.

Full details of all axles including Make & Model shall be provided in the technical bid.

3.0 SUSPENSION

Equalizing Beam suspension with auxiliary leaf spring / rubber cushion rear axles and suitable Leaf Spring suspension at front axles with heavy-duty double acting shock absorbers. ***Air Spring*** **type suspension (both at front & rear) is not acceptable.** Details of suspension including Make & Model shall be provided in the bid.

4.0 LOAD DISTRIBUTION

Proper positioning of all components/equipments on the platform for equal/even distribution of load on the axles. Details of load distribution on each axle shall be provided in the technical bid.

5.0 STEERING & TURNING RADIUS

Right Hand Drive (Steering Wheel on Right Hand Side of the Vehicle) Hydraulic Power Assisted Steering - **power assistance on all front wheels.**

Turning radius shall be as minimum as possible and shall not be more than 20.00 meters.

Suitable power cut-off pneumatic / hydraulic mechanism (operating switch & visual indicator inside driver's cabin) to engage & disengage the steering pump from the engine as & when required – especially to avoid idle running of the pump during Rig operation. The visual indicator shall be complete with suitable transducer to sense status (rotation) of the steering pump.

6.0 WHEELS & RIMS

Suitable wheels with **tube & tyre** of adequate ply rating and preferably of 14.00 x 20 size for both front and rear axles with two sets of complete Spare Wheel. **It shall be bidder's endeavour to offer front and rear wheels as well as rims of same size & type. If not possible for design constraint, one spare wheel for each type shall be supplied**. Suitable lifting and mounting arrangement facility for the spares wheel shall be provided. (The platform of the outfit shall be adequately built so that there is no seepage of oil on the wheels from the platform).

7.0 BRAKES

a. **Service Brake –** Pneumatic Multiple Circuit Foot-operated Power Brake acting on all wheels.
b. **Emergency/Parking Brakes** - Automatically engaged Emergency Brake acting on all rear wheels in the event of low air pressure. Manual Hand Operated Parking Brake acting preferably on all wheels.
c. **All Emergency/Parking Brake Servos shall have manual release mechanism (Screw Type) to release the brake manually in case of low/no air pressure for maintenance and towing the unit whenever necessary.**
d. **All wheel brake drums shall have dust cover.**

8.0 PERFORMANCE

Speed limit in Highway	-	Approx. 40 Km/hr.
Gradeability	-	30 %

9.0 ELECTRICAL SYSTEM

Lights & reflectors viz. Headlights, Parking lights, Brake lights, Side marker lights, Indicator lights, Hazard warning lights, rear and side reflectors, Cabin lights, etc. as per standard and suitable Reversing Audio Alarm with Blinker at rear of the unit.

In addition, 2(two) powerful searchlights with protective guard at suitable locations at rear of driver's cabin with operating switches inside the driver's cabin for illuminating the entire platform area.

While all lights shall be covered to the extent possible with suitable guard to prevent damage, all electrical fittings/components/connections shall be suitable to operate in hazardous oilfield area preferably with two wire system.

There shall be a suitable electrical power cut-off master switch to disconnect power supply to all carrier electrical components viz. engine starter, lights (including the two searchlights mentioned above), meters & gauges inside the driver's cabin, etc. during rig operation as a safety measure. The switch shall be positioned behind (outside) the driver's cabin in a suitable enclosure / box and at a suitable height for easy operation from ground.

10.0 PNEUMATIC SYSTEM

Pneumatic system with suitable Air Dryer (replaceable element type) and suitable System Protection Valve(s) to keep rest of the circuits active in the event of failure/leakage of air in a particular circuit(s). All valves/components, piping/tubing, etc. underneath the carrier at easy access locations - preferably mounted on outer walls of the chassis. All air tanks shall have Drain Plugs.

Suitable tyre inflation valve with air pressure gauge shall be provided in the pneumatic system.

11.0 EXHAUST

Well-covered and non-conducting material wrapped Exhaust with heavy-duty spark arrester located behind the driver's cabin and projected above the top of driver's cabin.

12.0 DRIVER'S CABIN

Robust built comfortable full-width driver's cabin of pressed steel construction, suitably upholstered, all controls at easy access positions, full view Windshield of non-splinter glass, adjustable type comfortable driver's seat, co-passenger's seats (for minimum 2 co-passengers to assist the driver in traffic) and complete with all fittings/accessories viz. Windshield Wipers, Electric Fan(s), Roof Lamps, Sun visors, twin Rear View Mirror, Air & Electric Horns, Fire Extinguisher, First Aid Box, Handgrips/Handles, Footsteps, Lockable Door(s) with moving window glass, etc.

For maximum visibility on all sides for the driver, adequate number of windows with sliding lockable toughen/non-splinter glass at both sides and rear of the cabin as well as there shall not be any object behind and sides of the cabin obstructing view. The rear windows shall be provided with protective wire net cover from behind.

2 (two) seats for co-passengers (to assist driver in traffic) at left side of the unit near to driver's seat.

13.0 GAUGES, METERS, ETC. IN DRIVER'S CABIN

All standard gauges & meters like Speedometer with Odometer (KM calibration), Engine Oil Pressure Meter with low pressure warning buzzer, Engine Temperature Meter with high temperature warning buzzer, Engine Hour Meter, Engine Tachometer, Air Pressure Meter with low pressure warning buzzer, Ampere Meter, Transmission Oil Pressure Meter with low pressure warning buzzer, Transmission Oil Temperature Meter with high temperature warning buzzer, etc. with identification plate in driver's cabin **in addition to at Driller's console.**

14.0 TOWING HOOKS

Heavy-duty clevis pin type Towing Hooks both at front and rear capable of pulling/ towing the unit from bogged down situation in slushy areas in oilfields from front as well as rear. (Pin size minimum 25 cm in length and 5.0 cm in diameter).

15.0 SPARE PARTS (For carrier)

All spares in specified quantity as indicated in the enclosed Spare Parts List for Carrier shall be supplied along with the unit. Specific description, Part Nos., Make, etc. and Unit Price of each & every item (spare) shall clearly be indicated in the bid.

16.0 TOOL KIT

Complete Tool Kit for general maintenance of the carrier (i.e. for all components / sub-assemblies covered in this section-1 of NIT), Wheel wrench / wrenches, Tyre inflating hose of 20 meters long

with nipple, Tyre Pressure Gauge, etc. in a suitable portable Toolbox with lock & key provision, 1(one) no. minimum 20 kg capacity Heavy-duty Grease gun, 2(two) Nos. 50MT capacity Hydraulic Jacks with handles in addition to supply of similar tools, if any, as stipulated elsewhere in the NIT.
2(two) nos. Stopper Block for rear wheels – with suitable storage arrangement at easy access location(s) - to prevent accidental movement of unit while in stationary position.
List of tools that shall be supplied under the Tool Kit shall be submitted along with the bid.

17.0 PAINTING

Suitable shade (as stipulated elsewhere in the tender) painting after applying primer.
Under Coating with Anti Corrosive Treatment for cement & rust and polyurethane paint.

18.0 MANUALS & CATALOGUES

Supply of 6(six) sets of Spare Parts Catalogue and Workshop & Service Manual **in printed form** in addition to supply of the same in compact disc (CD) format for all major components/systems like steering, axles, front & rear suspension, pneumatic & electrical systems, brake system, etc. complete with all schematics along with the unit.

All above manuals, catalogues & CD shall contain only those components/systems that have been used in the unit i.e. the same must be CUSTOM ILLUSTRATED MANUALS/CATALOGUES ONLY – not the generalized ones.

Commissioning of the unit shall not be considered as complete until & unless all the printed manuals/catalogues are supplied.

19.0 DOCUMENTATION AND BID SUBMISSION

Bidder's response should clearly be defined – specific details/specifications are to be provided in the bid. Response like - 'As per NIT Specifications/ Technical Leaflet', 'Noted', 'Accepted' or in any similar fashion is not encouraged.

A. The following documents shall be submitted along with the bid for bid evaluation –

- **a.** Technical leaflets with detailed diagram and specifications, Make & Model of chassis, axles, suspension, steering, wheel & rim, brake, pneumatic and electrical systems, etc.
- **b.** Detailed dimensional drawing of Driver's cabin with construction and material description.
- **c.** Layout drawing of all components on the carrier with details of load distribution.
- **d.** List of tools that shall be supplied under Complete Tool Kit.
- **e.** Specific description, Make & Model, etc. and Unit Price of each and every item (spare) as detailed in the Spare Parts List for Carrier provided in the NIT.
- **f.** List of additional spares, if any, for 2(two) year maintenance as felt necessary but not covered in the Spare Parts List For Carrier provided in the NIT with Description, Part Nos., Make, etc. including Unit Rate. These spares are for reference purpose only & will not be considered for evaluation. Procurement of the same spares however shall be as per OIL's discretion.
- **g.** A Checklist as per enclosed format shall be furnished along with the bid. In case of any contradicting higher/better specification provided elsewhere in the bid, the specifications provided in Part 'A' of the said checklist shall only be considered for bid evaluation.

B. The following documents are to be submitted along with the supply/unit –

- **a.** Sale Letter, Pollution & Roadworthy Certificate (in similar format of Form 21 & 22A of Indian Motor Vehicle Act - sample copies enclosed), Engine Emission Norms Certificate, etc. as

required under Indian Motor Vehicle Act for registration of the unit in the name of **Oil India Limited.**

b. Final Chassis Built Up/Vehicle Content Record documents.

c. **Notwithstanding any clause mentioned elsewhere in the NIT, the invoice for *CARRIER WITH ENGINE & TRANSMISSION* shall be submitted separately, i.e. the same (invoice) shall include the cost of the chassis frame and all assemblies/components that are required for road movement of the unit only and the driver's cabin.**

20.0 CHECK LIST FOR CARRIER

Part A TECHNICAL

Sl. No.	PARAMETERS/REQUIREMENTS					BIDDER'S OFFER (To indicate details or yes/no, as applicable)	REMARKS, IF ANY
1	Dimensions	a	Overall Width				
		b	Overall Height				
		c	Length	i	Carrier		
				ii	Overall		
		d	Rear Overhang				
		e	Ground Clearance				
2	Chassis Make & Model (if any)						
3	Make & Model of transmission & gear shifter						
4	Drive						
5	No. of Axles	a	Front				
		b	Rear				
6	Positions of Drive Axles	a	Front				
		b	Rear				
7	Make & Model of Axles	a	Front				
		b	Rear				
8	Maximum Permissible GVW of the carrier						
9	Total Weight (Laden Weight) of the unit						
10	Axle capacity (per axle)	a	Front				
		b	Rear				
11	Axle Loading (per axle)	a	Front				
		b	Rear				
12	Axle Loading within 80% of Max. Permissible GVW						
13	Inter Axle Lock (provided or not)						
14	Differential Lock (provided or not – in all drive axles)						
15	Type, Make & Model of Suspension	a	Front				
		b	Rear				
16	Type, Size of Wheel & Tyre	a	Front				
		b	Rear				

17	Type of Service Brake	a	Front		
		b	Rear		
18	Make, Model & Type of Steering System				
19	Minimum Turning Radius				
20	Reversing Alarm with Blinker Lights				
21	Electrical fittings/equipments suitable for hazardous oilfield area				
22	Speedometer/Odometer in Metric (KM) calibration				
23	Additional gauges & meters inside driver's cabin as per NIT stipulations				
24	Provision of Air Dryer in truck's pneumatic system				
25	Towing Hooks at front & Rear of the carrier				

Part B DOCUMENTATIONS

Sl. No.	DESCRIPTIONS	DOCUMENT ENCLOSED Yes or No	REMARKS, IF ANY
1	Technical leaflets with detailed diagram and specifications, Make & Model of chassis, axle, suspension, steering, wheel & rim, brake, etc.		
2	Detailed dimensional drawing of Driver's cabin with construction and materials description.		
3	Layout drawing of all components on the unit with details of load distribution.		
4	List of tools that shall be supplied under Tool Kit (under carrier).		
5	Specific description, Part Nos., Make, etc. and Unit Price of each and every item (spare) as detailed in the Spares Parts List For Carrier provided in the NIT.		
6	List of additional spares as felt necessary for 2 years maintenance but not covered in the Spares Parts List provided in the NIT with Description, Part Nos., Make, etc. including Unit Rate.		

Signature _____
Name _____
Designation _____
Date _____

21.0 SPARE PARTS LIST FOR CARRIER

A. FRONT AXLE -

1. Wheel Stud with Nut(s)	1 full set for 2 wheels
2. Axle Stud with Nut	1 full set for 2 wheels
3. Wheel Hub Oil Seal	1 full set for 4 wheels
4. Wheel Hub Bearing	1 full set for 2 wheels
5. Differential Oil Seal (if any)	1 full set for all differentials

B. REAR AXLE -

1. Wheel Stud with Nut(s)	1 full set for 4 wheels
2. Axle Stud with Nut	1 full set for 4 wheels
3. Wheel Hub Oil Seal	1 full set for 4 wheels
4. Wheel Hub Bearing	1 full set for 2 wheels
5. Differential Oil Seal	1 full set for all differentials
6. Differential Filter Element (in any)	1 Set

C. DRIVE LINE (Propeller Shaft) –

1. UJ Cross (Spider and Bearing)	1 Set (For both Front & Rear Propeller shaft)
2. UJ Cross (if any) for steering pump	1 Set

D. STEERING -

1. Steering Oil Filter Element	5 Sets
2. Steering Pump Repair Kit	2 Sets
3. Steering Box Repair Kit	2 Sets
4. Steering Power Cylinder Repair Kit	2 Full Sets
5. Tie Rod End	2 Full Sets
6. Steering Pump	1 No.
7. Steering Power Cylinder	1 No.

E. PNEUMATIC SHIFTER OF STEERING PUMP

1. Shifter	1 No
2. Shifter Repair Kit	2 Nos.
3. Actuator for Shifter (if any)	1 No.
4. Repair Kit for Actuator (if any)	2 Sets.
5. Pneumatic Hoses for Shifter system	2 Complete Sets.

F. BRAKE & PNEUMATIC CIRCUIT -

1. Foot Brake Valve Repair Kit	4 Sets
2. Front Wheel Servo Repair Kit	8 Sets (for 8 servos)
3. Rear Wheel Servo Repair Kit	8 Sets (for 8 servos)
4. Air Dryer Filter Element	5 Nos.
5. Repair Kit for all Pneumatic Valves	1 Set each

F. GEAR SHIFTER (the one inside the driver's cabin) -

1. Gear Shifter	1 No.
2. Gear Shifter Repair Kit	2 Sets.
3. Gear Shifter Hoses	2 Sets

NOTE -

1. All spares in specified quantity as applicable & indicated above shall be supplied along with the unit.
2. Specific description, Part Nos., Make, etc. and Unit Price of each and every item shall clearly be indicated in the bid.

3. Bidder shall also quote separately for any additional spares with similar details as felt necessary but not covered in this list for future reference/procurement as indicated in the NIT.

22.0 SAMPLE OF FORM 21 & 22A

*This is a sample copy **similar to FORM 21 of Indian Motor Vehicle Act** only.*
The certificate to be issued by supplier shall contain following minimum information.

SALE CERTIFICATE

Certified that ……. (brand name of the vehicle) has been delivered by us to ……..…..…… on …… (date).

Name of the buyer ……..…….

Address ……..…….

The details of the vehicles are as under -:

1. Class of vehicle ……..
2. Maker's name & address ……..
3. Chassis No. ……..
4. Engine No. ……..
5. Horse power or cubic capacity ……..
6. Fuel used ……..
7. Number of cylinders ……..
8. Month and year of manufacturing ……..
9. Seating capacity (including driver) ……..
10. Unladen weight ……..
11. Maximum axle weight, number and description of tyres –
    (a) Front axle ……..
    (b) Rear axle/axles ……..
    (c) Any other axle ……..
12. Colour (s) ……..……..
13. Gross vehicle weight ……..

Date: ..... **Signature of the manufacturer / dealer**

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*This is a sample copy **similar to FORM 22(A) of Indian Motor Vehicle Act** only. The certificate to be issued by supplier shall contain following minimum information.*

CERTIFICATE OF COMPLIANCE WITH POLLUTION STANDARDS / SAFETY STANDARDS OF COMPONENTS AND ROAD WORTHINESS

Certified that …… (brand name of the vehicle) bearing Chassis number …… and Engine number …….. Complies with the …… (Name of Emission Standard – Euro II, etc.) Emission standard as well as other Safety & Road Worthiness Standards as per provisions of the …… …….. (Name of Motor Vehicles Act of country of origin).

Signatures of Manufacturer / Body Builder

_____

SECTION 2: ENGINE & TRANSMISSION

1. ENGINES

1.1. The engines (TWO) should be naturally aspirated / turbo charged, in line, six cylinder, four stroke diesel engine, (preferably Caterpillar C-15 ACERT Model) each capable of developing a net minimum horse power of 440 at 2100 RPM with minimum compression ratio of 14.5:1 under standard reference conditions of atmospheric conditions of atmospheric temperature of 27 degree Celsius, altitude not exceeding 150 meter above mean, relative humidity 60% at 27 degree centigrade. The engine should be suitable for continuous duty & capable of developing 10% in excess of its rated output at its rated speed for a period of 1 hour in any period of 12 hours continuous running without undue heating or any other mechanical trouble. The engine should be anti clockwise while looking from the flywheel end.

1.2. EMISSION NORMS

The engine shall confirm to minimum EURO-III / BAHRAT STAGE-III or equivalent emission norms, it shall be bidder's endeavor to offer Caterpillar or Cummins (Big Cam) make engines only. **In case of engine with Electronic Controller System, Engine Fault Diagnostic Tools (both software as well as hardware) shall be supplied along with the unit. Bidder shall categorically confirm in the bid that the offered software is for the particular engine of the truck.**

1.3. The bidder should specify the following information along with relevant performance ratings curves & conditions.

- Gross horse power developed at rated RPM.
- Deduction for altitude, temperature etc.
- Deduction for fan, alternator & ancillary equipment.
- Net HP available at rated RPM & site conditions.

1.4 The engine will be used as prime mover for draw works & also for movement.

1.5 The fuel used by the prime mover:-

High speed Diesel	:	Diesel to be used conforms to IS:1593-1982.
Cetane No.	:	42.5
Gross calorific valve:		19.480 BTU/LB (10.800 Cal /gm)

1.6 Each engine offered is to complete with the following components mounted on it.

2. AIR INLET SYSTEM

Heavy duty dry type air cleaner with pre cleaner

3. COOLING SYSTEM

Circulation pump –Centrifugal type
Thermostat Housing
Heavy duty Radiator for industrial use, mounted on the base rail with the engine and with sucker type fan & fan guard for ambient temperature having capacity at least 20% in excess of total heat rejection of the engine. Heat load calculations are to be submitted along with the offer for our scrutiny.

4. FLYWHEEL & FLYWHEEL HOUSING

Flywheel with ring gear and resilent plate to suit Allison transmission supplied.
Flywheel Housing SAE # 1
SAE Standard Rotation

5. FUEL SYSTEM

Fuel pump
Fuel injection & Injection system.
Flexible Fuel Lines

6. FUEL PUMP GOVERNOR

Mechanically variable speed governor with PT Fuel pump.
Pneumatic throttle actuator

7. LUBE SYSTEM

Crankcase Breather
Oil Cooler
Additional cooler for torque converter oil
Oil Filter
Shallow Oil Pan
Oil Pan Drain Cover

8. EXHUST SYSTEM

Spark Arresting Muffler
Exhaust Fittings, Flexible
Exhaust Flange & Fittings, Weldable
Water Shielded Exhaust Manifold
Elbow Exhaust
Exhaust position should be as specified in SECTION – 1 (Clause no. 12.0)

9. EMERGENCY AIR SHUT OFF DEVICE

Inlet Air shut off device should be designed in such a way that it

- Can be operated manually at the Inlet manifold of the engine.
- Can be operated from Driller's console with a knob. Necessary hose connection in a plstic conduit sealed to be provided.

10. INSTRUMENT PANEL (To be mounted rigidly with the engine)

Instrument Panel LH 8 Hole.7 Gauge
Oil Pressure
Fuel Pressure
Oil Filter Differential Pressure
Water Temperature
Electronic Tachometer
Service Meter
Exhaust Temperature
Engine starting switch with key
Engine stopping switch
Engine stopping switch (preferably push button type) also from Driller's console & from Driver's cabin.
Emergency air shut off switch from the Driller's console & from Driver's cabin.
Digital fuel tank meter with guard.

11. SAFETY SYSTEM

Low lube oil pressure switch. Range 8-12 PSI (0.5-0.8 Kg/Sqcm), with Alarm switch for low lube oil pressure.
High Water Temperature switch 96 Deg.Cent. with Alarm switch for high water temp.
Over speed switch with Alarm switch for over speed.
High inlet air temp. Switch 110 Deg. Cent, with Alarm switch.
High lub oil temp. Switch 110 Deg. Cent, with Alarm switch.
Air Inlet Shutoff
Manual Shutoff Control, LH
Emergency stop push button

12. AIR DRYER for air compressor

Air dryer without heating system. Mounted before the air receiver with pipe connection. **Model & make of the compressor with detailed catalogue, literature & drawing, etc. to be provided along with the offer.**

13. AIR COMPRESSOR

Single / Twin cylinder air compressor with minimum capacity of 31 CFM (889 lpm), 120 PSI approx. Model & make of the compressor to be provided along with the offer.
Suitable capacity air receiver mounted on the carrier, Size & capacity to be mentioned along with the quotation.
Air receiver to be tested at 1.5 times than the working pressure. **Test certificate to be provided**.

14. STEERING PUMP

Driven from the lub oil pump of the engine with suitable coupling.
Suitable capacity
Suitable capacity mounted tank
Suitable power cut-off pneumatic / hydraulic mechanism (operating switch inside driver's cabin) to disengage the steering pump from the engine to avoid idle running of the pump during rig operation. Visible indication should also be available for disengage the steering pump from the engine lub oil pump.

15. STARTING SYSTEM

Each Engine Should have the two starting systems as :-

(a) Air starting motor RH, air pressure 90- 150 psi, Air silencer LH and Vapor Arrestor
Air Driven Pre lube pump

(b) 24 volt electric starting system

Two (2) nos. of Heavy duty batteries complete with cable & connection to be provided in a wooden box with lock & key placed & mounted suitably in the carrier near the engine. Each engine should have 24 volt battery charging alternator.

16. FUEL TANK

One (1) nos. 100 US gallon minimum capacity fuel tanks (Aluminum) with filling cap with lock & key, drain plug etc. Fuel entry & return line from diesel tank to engine. Digital fuel tank indicator with guard mounted at the top of the tank and also in the control panel. **Drain plug, Filling cap to be guarded.**

17. OPERATION SYSTEM

Single or dual engine operation as per load requirement.
System should be suitable for both engines for roading, however only one engine will be used for roading purpose.

18. HYDRAULIC SYSTEM

Two nos. of Hydraulic pumps to get positive suction from reservoir, each with minimum capacity 50 GPM @ 2500 psi.
Driven from PTO mounted on transmission.
Necessary pipe connection.
Control valve for hydraulic fluid installed at hydraulic control position.

Hydraulic system can be operated from each engine separately or both engines together.
Minimum 300 gallon (1130 ltrs.) hydraulic reservoir.

The system shall provide hydraulic for:

- Power Casing (3.1/2" – 14") / Tubing tongs
- Raising & lowering mast.
- Telescoping upper section of mast.
- Leveling jacks.
- Utility wrench.

19. GENERAL

Vibration Dampner and guard
Lifting eyes
Fumes disposal
Engine barring group
Crankcase breather
Crankcase front electronic Tachometer
Heavy duty servicing hour meter
Front engine support
Maintenance tool
Standard painting of the engine
Suitable detachable canopy over the engines (below the mast in rig down operation) without obstructing the mast rig up or rig down operation. System should be such that canopy may be raised high for maintenance job during the rig in rig-up position.

The engine should be mounted in such a way so that engine crankcase can be lowered during servicing/ maintenance of the engine without lowering the complete engine. There should be sufficient space between the two engines so that maintenance crew can get sufficient space to work around in case of breakdown.
The engine, radiator & its accessories and transmission assembly should be mounted on a common skid. This skid should be bolted to master skid of the carrier. This will allow us to transfer the complete set to workshop for maintenance job as & when required.
All hydraulic & pneumatic lines should be plastic conduit sealed & suitable marking so that they can be identified as & when required.
Layout dimensional diagram should be forwarded along with the offer.
The engine is to be supplied with all the components & accessories fitted.

20. ALLISON TRANSMISSION

Two (2) Nos. of Allison Transmission, 4000 series with 4th Generation Controls, automatic Gear shifting, suitable model for transmitting minimum 450 hp directly coupled with engine with provision for mounting PTO driven hydraulic pump.
5 nos. forward & 1 reverse speed with Torque converter
Necessary air connection / controls to operate either from Driller's console (during drilling) or from Driver's cabin (during the movement)
Oil filter
Converter oil pipe
Transmission oil cooler with water connection.

Note:- All the electrical / electronic circuit diagrams for operation of the Transmissions have to be furnished along with the offer
ANY ITEM/POINTS NOT INCLUDED BUT NECESSARY FOR EFFICIENT CONTROL AND OPERATION OF THE SYSTEM SHOULD BE STATED BY THE BIDDER

21. OPERATING SITE CONDITION.

The engine should be suitable for operation at the following site condition –

Engine site temperature	-	41°Cent. (Max)
Engine site temperature	-	6°Cent. (Min)
Maximum relative humidity at 21°C	-	100%
Maximum relative humidity at 35°C	-	95%
Maximum relative humidity at 41°C	-	70%
Altitude above sea level	-	150 m.
Average annual rainfall	-	343 cms.

22. CHECKLIST FOR ENGINE & TRANSMISSION

Part A TECHNICAL

Sl. No.	PARAMETERS/REQUIREMENTS	BIDDER'S OFFER (To indicate details or yes/no, as applicable)	REMARKS, IF ANY
1	Make & Model of Engine		
2	Make & Model of Transmission Assembly		
3	Make & Model of Air Compressor		
4	Make & Model of Hydraulic pump		
5	Make & Model of Air Dryer		
6	Make & Model of Steering pump		
7	Make & Model of PTO		
8	Make & Model of Gear Shifter		
9	Make & Model of Air Shut off Device		

Part B DOCUMENTATIONS

Sl. No.	DESCRIPTIONS	DOCUMENT ENCLOSED Yes or No	REMARKS, IF ANY
1	Maintenance & Operators manual, Engine built up records, Parts list of the engine		
2	Lubrication, fuel system electrical, hydraulic system of the engine		
3	Performance rating curves of the engine		
4	Specific fuel consumption of the engine		
5	Emission norms of the engine		
6	Heat load calculation of the engine		
7	Hydraulic, pneumatic system of the unit		
8	Maintenance manual, parts list of Air compressor, Air dryer, Steering pump, PTO, Gear shift control, Air shut off device, Allision Transmission, etc.		
9	Dimensional layout diagram of the complete unit on the carrier.		
10	CMRI (India) certificate or equivalent certificate and DGMS (India) or equivalent certificate from competent authority from the country of origin for Electrical & Charging system of the Engine.		

Signature _____
Name _____
Designation _____
Date _____

23. SPARE PARTS FOR ENGINE & TRANSMISSION

Following spares in specified quantity as indicated should be supplied along with the unit. Specific description, part nos., make, etc. and unit price of each and every item shall clearly be indicated in the bid.

a)	Fuel filter / element for engine	-	2 sets for each engine
b)	Lube oil filter / element for Engine	-	2 sets for each engine
c)	Air filter / element for engine	-	2 sets for each engine
d)	Repair kit for air compressor	-	2 nos.
e)	Repair kit for hydraulic pump	-	2 nos.
f)	Element for Air dryer	-	2 Sets
g)	Oil filter for Allision transmission	-	2 Nos.
h)	Fuel entry & return line from the tank to the fuel filter	-	1 Set
i)	Electric flame proof starter	-	1 No
j)	Fuel Injectors	-	1 Set

24. TOOL KIT FOR ENGINE & TRANSMISSION

One set of standard tools for carrying out normal maintenance of engine, transmission & hydraulic system should be supplied in a convectional tool box. (Details of such tools with quantity should be clearly indicated).

In addition undernoted special tools should be supplied along with the rig package for carrying out major overhauling jobs. These tools must be supplied in proper too box. Specific description, part nos., make, etc. and unit price of each and every item shall clearly be indicated in the bid.

For Engine:

i)	Liner Pullar	-	1 No.
ii)	Piston Insert tool	-	1 No.
iii)	Piston ring expander	-	1 No.
iv)	Injector puller	-	1 No.
v)	Timing adjustment tool	-	1 No.
vi)	Bearing puller for fan shaft	-	1 No.

For Allision Transmission

i)	Rear Bearing removing tool	-	1 No.
ii)	Converter pump snap ring removal cum installer tool	-	1No.
iii)	Converter pump single row ball bearing puller set	-	1 Set
iv)	Main shaft lifting bracket	-	1 No.
v)	Rear carrier lifter	-	1 No.
vi)	Main pressure & lockup valve spring compressor	-	1 No.
vii)	Clutch spring compressor set	-	1 No.
viii)	Forward, forth, fast clutch clearance gage	-	1 Set
ix)	Forward & fifth clutch spring compressor	-	1 No.

25. DOCUMENTATION & BID SUBMISSION

Bidder's response should clearly be defined. Bidder shall furnish specific details/specifications of all major components, system with make & model etc. Generalised response like - 'As per NIT Specifications/ Technical Leaflet', 'Noted', 'Accepted' or in any similar fashion is not encouraged.

It shall be bidder's endeavor to offer the following items as per make & models indicated against each item (other suitable makes & models are however acceptable in case of operational and / or design requirements supplemented with proper justification).

- **Engine - Caterpillar C-15 ACERT**
- **Transmission - Allision**
- **Hydraulic pump - Parker**
- **Air Compressor - Bendix-Tuflo**
- **Air Dryer - Wabco Single Chamber Air dryer, without heater**
- **Steering Pump - Victor, Parker, Rexrotch**
- **Emergency air shut off device - Barber**

NOTES FOR SECTION 2

1. SPARE PARTS

Spares for two years normal operation of engine and its accessories should be included in the offer. Item wise breakdown price of spares should also be provided. Bidder should indicate the part nos. against each item along with supplier's part no. if any. The cost of spares will not be considered for price comparison.

2. PARTS LIST, INSTRUCTION MANUAL & DRAWING, TECHNICAL INFORMATION & BULLETIN.

The supplier should provide 6 (six) set of parts list, dimensional drawing of all major components, operations manual & service manual covering all the items with the delivery of the material. Technical details of the engine, Allison transmission etc. along with 1 (one) set of part list, dimensional drawing of all major components, operation manual & service manual are to be provided along with the offer.

The supplier has to provide installation diagram of the complete set along with performance curve along with the quotation for our technical scrutiny.

The bidder shall furnish technical data sheets and dimensional drawing along with the quotation.

3. TEST CERTIFICATE

The complete sets have to be load tested at manufacturers work & test certificate have to be provided along with the delivery of material. Our engineer will visit to witness the load test.

The nature of after sales services, which can be provided by the successful bidder during initial commissioning as also in subsequent operation, should be clearly indicated.

Supplier must categorically confirm regarding compliance with the inspection / test procedure and other terms and conditions detailed above are very essential. Offers will be liable for rejection in the absence of such confirmation.

Deviation in respect of any specification as detailed above should be highlighted with technical calculation / catalogue/literature etc.

SECTION 3: DRAW-WORKS, MAST & SUBSTRUCTURE

1. DRAW WORKS:

Input horsepower rating: 750 hp (559 kW) minimum.
Nominal depth rating: 3200 m (10500 ft) with 5" OD drill pipe &
4500 m (14760 ft) with 3.1/2" OD drill pipe.
Minimum Hoisting capacity: 176 Short Tons (160 MT or 352740 lbs.).
Single drum draw works having main drum lebus grooved for 1.1/8" drilling line.
The Draw works shall be operated by a maximum of two engines having a combined horsepower as indicated in Section 2.
The Draw works shall have a minimum of 4 forward speeds and 1 reverse speed for hoisting and rotary drive respectively.
The Draw works shall be provided with pneumatically operated clutch & drive line to the rear for driving rotary.
The Draw works shall have suitable brake water cooling system including pressure type water reservoir.
Main drum should be driven by high capacity airflex pneumatically operated clutches.
All draw-works drive sprockets with cottered type chains should confirm to API Spec 7F. These should be fully enclosed in independent type oil bath system.
Draw-works should have centralized greasing system.

2. DISC BRAKE:

One (1) suitable water-cooled disc brake assembly, to serve as assist brake to main drum friction brake, with suitable capacity water tank, valves and piping installed on the carrier. Bidder to indicate the make, model, type, etc. while quoting.

3. TWIN STOP DEVICE (CROWN & FLOOR SAVER):

One (1) Pneumatically activated Twin-stop Device – Crown Saver to prevent collision between traveling block assembly and the crown block assembly, Floor Saver to prevent collision between the traveling block assembly and the drill floor. The device should be complete with override & reset buttons at driller's console.

4. DRILLER'S CONSOLE:

One (1) Driller's console, adjustable height, located at the rear of the carrier incorporating all functions to carry out drilling operations smoothly such as air controls for main drum clutch, engine throttle, engine shutdown, transmission, rotary table, catheads, hydraulic controls for auxiliary winch, Emergency engine shutdown system, brake water control, etc.
Mechanical controls located adjacent to the console for drawworks brakes (i.e. main drum & sandline drum).
The Driller's console should be so designed that the Driller has full view of traveling block & racking board. A removable type shed shall be provided over the console in order to protect the driller from rain.
Additionally, following minimum instruments should be mounted in suitable enclosure at Driller's console arranged in such a manner to give clear view of each & every gauge to Driller while operating the draw-works.

- One (1) Weight Indicator system Type D metric E80, preferably Martin Decker make with sensator. Should be complete with 6, 8, 10 & 12 line dials for 1.1/8" line size.
- Two (2) Mud pressure gauges (6") 0-5000 PSI rated. The mud pressure gauge system should have one (1) gauge for standpipe and one (1) for annulus pressure
- One (1) Rotary Torque Indicator

- One (1) Rotary RPM Indicator
- One (1) Tong Torque Indicator
- All controls for draw-works & rotary.
- Two (2) Pump Stroke Counters for one Mud Pump with 50 ft. long cable.
- Controls for two rig engines includes start / stop, throttle & Emergency shut down.
- Controls for two mud pumps includes start / stop, throttle & Emergency shut down.
- Start & stop control for mud pump superchargers.
- Control for disc brake
- Any other instrument as felt necessary by the manufacturer.

5. ELEVATED ROTARY DRIVE:

Elevated chain rotary drive, with suitable mechanism for driving 27.1/2" Rotary Table by means of suitable airflex clutch drive from the rotary counter shaft or propeller shaft, with oil bath chain guard, heavy duty spherical roller bearings, sprocket for rotary table & provision for Rotary Torque & Rotary Speed Sensors.

6. SERVICE WINCH

Suitable hydraulic winch complete with ½" or 9/16" wire line, tail chain, control valve & hoses installed having bare drum line pull capacity of minimum 5000 lbs. & around 250' long line capacity.

7. HYDRAULIC SYSTEM

One (1) Suitable hydraulic system for heavy duty power casing tong (3.1/2"–14"), raising & lowering the mast & operating hydraulic winch. The system should have a pressure rating of 2500 psi at 50 GPM (minimum) & 37x commercial shearing motor & 25x commercial shearing pump. Minimum 300 gallon reservoir, safety bypass relief valve to prevent accidental pressure increase, torque regulating valve, filter, diverting valve with hydraulic outlets at rear of rig for connection to casing / tubing tong. System should be complete with two hydraulic pumps one on each Allison transmission should be installed.

8. MAST:

One (1) Two-section Telescoping Mast manufactured & monogrammed per API Spec 4F (PSL 1, SSL E2/U2), latest edition, with hydraulic mast tilting & extending systems and automatic locking device to lock the mast into its fully extended operating position; with safety chokes to assure a safe descent rate to protect the mast in the event of failure of the hydraulic system / abrupt loss of hydraulic pressure; an unobstructed line of vision to the crown block
The mast shall have:
Clear height (below crown) from the ground: 116 feet (35.35 M) Approx.
Static hook load capacity: Minimum 176 Short Ton (160 MT or 352,740 lbs) with 8 lines strung
Wind load resistance with full set back: Minimum 40 mph (64 kmph) without guy lines.
One (1) minimum 176 Short Ton (160 MT or 352,740 lbs) capacity Crown Block Assembly with adequate no. of sheaves for stringing up 8 lines (maximum) of size 1.1/8" with conventional block to hang flat with the mast.
One (1) Winch Line Sheave Assembly
One (1) Sand Line Sheave Assembly
One (1) Sheave Assembly (suitable for 5/8" wire line) for Power Casing Tong.
One (1) Traveling block cradle in the upper section of mast
At least two (2) Mast Load Guylines from Crown to the Front Mast Support
Four (4) wind guys to crown and two (2) cross guys to racking board
(Guy lines should be complete with thimbles, clamps, heavy duty turn buckles & guy posts)
One (1) Escape line complete with two safety trolleys for escape of persons from racking board in case of emergency.

Crown block assembly should be complete with sheaves for catline, sandline, sheave units for rig tongs, power tong / pipe spinner. Crown platform should be provided with metal flooring & handrails all around with entrance from ladder.
Two (2) sets Tong Counter Weight Boxes complete with guide, pulleys, lines, etc
One (1) Adjustable stabbing board for lowering casing of Range III length.
Full length ladder upto crown platform (preferably caged).
Mast level & tilt indicators.
Mast rest pad complete with supporting frames should be suitably positioned on the carrier for resting the collapsed mast during transportation. The frame should not obstruct the driver's view in any case.

9. MAST CONTROLS:

Mast raising, lowering, and telescoping controls shall be installed at a convenient position near the base section of the mast close to the operator's console to give operator unobstructed view of mast during raising & lowering. **Should not involve Re-positioning or Removal of Driller's console & brake linkages during raising / lowering of mast.**
Mast Alarm – Located at & actuated by Latch pin. Should sounds air horn to signal latch pins are extended & locked. Suitable color painted for visual control.

10. TELESCOPIC FRONT & REAR LEVELLING JACK SCREWS

Hydraulically operated mechanically locked type jackscrews at the front & rear as well as a pair of belly jacks to stabilize the rig while the mast is being raised should be provided. The control of these jacks should be along with mast control. Each jack must have separate control.

11. RACKING / TUBING BOARD:

Racking board that automatically lowers into operating position and folds over the mast while roading
Shall be of adjustable height i.e. 50 ft., 55 ft., 60 ft. & 65 ft. from ground level and mount at different positions
Racking capacity: Min. 10500 ft (3200 m) of 5" OD Drill Pipe of Range-II length in doubles. Provision should be made to rack 14760 ft (4500 m) of 3.1/2" OD Drill Pipe of Range-II length in doubles or 2.7/8" EUE Tubing of Range-II length in doubles.
At least twelve (12) nos. of 6.1/2" or 8" drill collars of Range-II length in doubles.
Locking chains on all fingers to prevent pipe swarming
Telescopic centre walkway and handrails around racking platform.

12. CATHEADS:

Two (2) steel catheads (hydraulically or pneumatically operated for make-up & breakout operation, preferably FOSTER make) to be provided at suitable place complete with manilla rope guard, cat line girts & three roller guides. The spinning, make-up and breakout controls shall be located at the Driller's console. The catheads should be so placed in order to have clear visibility of well centre by its operator. Emergency controls for stopping the cathead should be provided near to it.

13. STAND PIPE:

One (1) 4" OD x 5000 PSI WP Single Stand pipe, top gooseneck, forged 160 degree, with threaded 4" fig 1002 hammer union for Rotary Hose connection, clamp-mounted on off-driller's side of the mast. Misaligning unions for connection to floor manifold. Top gooseneck, forged 160 degree, with threaded hammer union for rotary hose connection. Standpipe gooseneck should be at approx. 55 ft. from ground level for use with 40 ft. Kelly, 55 ft. hose & 20 ft. high sub-structure.

14. SUBSTRUCTURE ASSEMBLY:

Substructure assembly, telescoping type with provisions for mounting 27.1/2" Rotary Table, manufactured & monogrammed per API Spec 4F
Floor height adjustable from 17 ft to 20 ft
Min. Clear height under Rotary Beams: 14 ft (When adjusted at 17 ft. height)
Static Rotary Capacity: 253 Short Ton (230 MT or 507,000 lbs) Minimum.
Pipe Setback Capacity: 137 Short Ton (125 MT or 275,600 lbs) Minimum.
Combined Static Rotary & Setback Capacity: 390 Short Ton (355 MT or 782,600 lbs) Minimum.
Work Floor Dimensions: 18 ft x 18 ft (Min.) with wings folded out.
The Substructure shall be equipped / provided with:
Wooded setback area
Two-piece Rig Ramp complete with tire guides, jack supports and pin connection to substructure, for improved rig stability and to aid in placing rig in position during rig up
BOP trolley beam complete with two BOP trolleys & hoists to facilitate movement of BOPs including 13.5/8" x 5M BOP, into the side of the substructure.
Two (2) Rig tong back-up posts
Two stairways with proper railings from substructure floor to ground, one located on Driller's side & one on Off-Driller's side
Two stairways, one on each side, from substructure work area to Carrier bed
"Vee" door ramp with stairway to catwalk ("Vee" door mounts to be provided on Driller's side & setback side of substructure).
Provision for rat hole and mouse hole openings.
Sub-structure should meet the transportable dimensions stated in Section – 11 and should not have any cross / diagonal braces to foul with the well head.

Note:

1. **Sub-structure should be suitable to accommodate cellar having the inside dimensions of 2.2 M wide x 3.6 M long and overall dimensions of 2.6 M x 4.0 M considering the reinforcement.**
2. **The braces / cross braces of sub-structure should not obstruct the cellar opening of 2.2 M x 3.6 M.**

15. LIGHT WORK WELL SERVICING PLATFORM:

The platform should be adjusted to mount at different heights from 4 ft. to 10 ft. in the holes provided in the mast leg rails. Floor size 8 ft. wide & 6 ft. long with optional wings to increase area & safety railings. A pull out central panel should be provided in the centre of the platform to allow suitable space over the well head. The platform should have telescopic support to fit in to the vehicle ramp base beam. It should meet the transportation dimensions stated in section – 11.

16. DEADLINE ANCHOR:

One (1) Deadline Anchor suitably mounted on the Carrier Frame for anchoring the drill line of size 1.1/8". Designed

17. WALKWAYS:

Foldable type full length walkways complete with safety railings should be provided on both sides of draw-works. The walkways should be hinged to the carrier in such a way that it can be folded upward in small sections during transportation maintaining the overall width of the carrier (as indicated in Section-1).

18. TOOLS:

One (1) set of tools & wrenches for breakdown maintenance of draw-works & drilling equipments in proper size tool box mounted on the carrier with locking arrangement. (List of tools should be furnished in the bid document).

SECTION 4: DRILLING EQUIPMENT

1. ROTARY TABLE:

One (1) 27.1/2" Rotary Table, manufactured & monogrammed per API Spec 7K, with 27.1/2" (698.5 mm) table opening and static load rating of 500 Short Tons (453.6 MT or 1,000,000 lbs.). The rotary table should be complete with API Spec 7K square drive split master bushings, master bushing lifter, casing bushings complete with lifters suitable for 20" casings and API insert bowl No. 1 & 2 with lifters suitable for 13.3/8" & 9.5/8" casing respectively.

2. ROTARY SWIVEL:

One (1) Rotary swivel, manufactured & monogrammed per API Spec 8C, having static load rating of minimum 250 Short Tons (226.8 MT or 500,000 lbs.) complete with bail bumper support, goose neck connection to Rotary hose (4" fig 1002 female) etc.
Swivel pin connection: 6.5/8" API Reg. left hand.

3. TRAVELLING BLOCK & HOOK:

One (1) minimum 187 Short Ton (170 MT or 374,782 lbs.) capacity unitized traveling block & hook, manufactured & monogrammed per API Spec 8C, with 5 (five) sheaves grooved for 1.1/8" OD wire line & fully compatible with the crown block assembly.

4. ELEVATOR LINKS:

One (1) pair weldless elevator links, 2.1/4" x 96" of Rated Capacity 250 Short Ton (226.8 MT or 500,000 lbs.) manufactured & monogrammed per API Spec 8C. The links should be compatible to traveling block & hook under sl. No. 3 above.

5. CASING / DRILLING LINE:

One (1) reel API Spec 9A wire rope, 1.1/8", 6 x 19 IWRC, Improved Plow Steel, Right Regular Lay, length to be specified by the bidder per requirements of the rig (approx. 2000 ft); to be reeved & installed on the rig for drill line application during commissioning.

6. ROTARY HOSE:

One (1) suitable rotary hose 4" ID, 5000 psi working pressure, 55 ft. long, conforming to API Spec. 7K, complete with safety clamps at both ends & necessary fittings for connection to stand pipe & swivel goose neck (i.e. 4" fig 1002).

7. DRILL PIPE SPINNER:

One (1) Pneumatic Drill Pipe Spinner, size range 2.7/8" – 7", avg. torque 1285 ft lbs., right & left hand rotation, complete with spring hanger assembly, intake hose, muffler, chain and Operations & Maintenance Manual; lubricator & dryer shall be installed on the spinner unit

8. KELLY SPINNER:

One (1) Pneumatic Kelly Spinner manufactured & monogrammed per API Spec 8C, 6.5/8" API Reg LH box up & pin down, Max. Stall torque 1200 ft lbs, with two motors for right & left hand rotation, complete with controls, valves, fittings and hoses.

9. HYDRAULIC CATHEAD:

Hydraulic Catworks Make-Up and Break-Out.
127 mm (5") X 1,524 mm (60") breakout catworks cylinder, 14,900 kg. (31,000 lbs.) tong line pull. Mounted in the mast with hydraulic controls and line guide rollers.

127 mm (5") X 1,524 mm (60") make-up catworks cylinder, 2,348 kg (5,166 lbs.) tong line pull. Mounted in the mast with 6 part reeving for tong line, hydraulic controls and line guide rollers.

10. SPARE PARTS FOR SECTION 3 & 4:

Following additional spares in specified quantity as indicated should be supplied along with the unit. Specific description, part nos., make, etc. and unit price of each and every item shall clearly be indicated in the bid.

a)	Repair kit for telescopic cylinder	-	2 sets
b)	Repair kit for tilting cylinder	-	2 sets
c)	Repair kit for all leveling jacks (i.e. front & rear)	-	2 sets
d)	Guy lines' turn buckles	-	1 Set
e)	Guy posts	-	1 Set
f)	Sheaves set for cat line, sand line, rig tongs, power tong / pipe spinner	-	1 set
g)	Sprocket, rotary table	-	1 no.
h)	Swivel wash pipe assembly	-	1 set
i)	Repair kit for hydraulic pump (commercial shearing)	-	2 sets

8. MANUALS & CATALOGUES (for Section 3 & 4)

Spare Parts Catalogue, operation, service & maintenance manuals **in printed form** in addition to supply of the same in compact disc (CD) format for all major components/systems like draw-works, disc brake, driller's console, hydraulic system, mast, sub-structure, rotary table, rotary swivel, traveling block, etc. complete with all schematics along with the unit. i.e. 1 (one) set (in printed form) along with bid documents for evaluation purpose & 6 (six) sets with supply of materials.

All above manuals catalogues & CD shall contain only those components/systems that have been used in the unit i.e. the same must be CUSTOM ILLUSTRATED MANUALS/CATALOGUES ONLY – not the generalized ones.

Commissioning of the unit shall not be considered as complete until & unless all the printed manuals/catalogues are supplied.

9. DOCUMENTATION AND BID SUBMISSION (for section 3 & 4)

Bidder's response should clearly be defined – specific details/specifications are to be provided in the bid. Response like - 'As per NIT Specifications/ Technical Leaflet', 'Noted', 'Accepted' or in any similar fashion is not encouraged.

The following documents shall be submitted along with the bid for bid evaluation –

1. Technical leaflets with detailed dimensional diagram and specifications, Make & Model of draw-works, hydromatic brake, mast, sub-structure, rotary table, rotary swivel, traveling block & hook, casing / drilling line, rotary hose, etc.
2. A Checklist as per enclosed format shall be furnished along with the bid.
3. Copies of valid API Spec 4F, 7F, 7K, 8C & 9A respectively. In case any of the accessories / component will be purchased by bidder from other manufacturer, then copy of authorization from OEM is to be forwarded.

10. CHECK LIST & DOCUMENTATIONS FOR SECTION 3 & 4

TECHNICAL

Sl. No.	PARAMETERS/REQUIREMENTS			BIDDER'S OFFER (To indicate details or yes/no, as applicable)	REMARKS, IF ANY
1	Draw-works	a	Input Horsepower		
		b	Nominal Depth Rating		
		c	Hoisting Capacity		
		d	Drilling line size		
		e	Lubrication system		
		f	Greasing System		
		g	Hydromatic brake		
2	Mast	a	Clear Height from ground		
		b	Static hook load Capacity		
		c	Wind load resistance		
3	Crown Block	a	Capacity		
		b	No. of Sheaves		
		c	Drilling line diameter		
4	Racking / Tubing Board	a	Capacity		
		b	Adjustable height range		
5	Sub-structure	a	Adjustable height range		
		b	Static rotary capacity		
		c	Pipe set back capacity		
		d	Combined capacity		
		e	Work floor dimensions		
6	Rotary Table	a	Size		
		b	Static load rating		
7	Rotary Swivel	a	Capacity		
		b	Connection size		
8	Traveling Block	a	Capacity		
		b	No. of Sheaves		
7	Casing / Drilling line size				
8	Rotary Hose	a	ID x WP		
		b	Length		

DOCUMENTATIONS

Sl. No.	DESCRIPTIONS	DOCUMENT ENCLOSED Yes or No	REMARKS, IF ANY
1	Technical leaflets with detailed dimensional diagram and specifications, Make & Model of draw-works, disc brake, mast, sub-structure, rotary table, rotary swivel, traveling block & hook, casing /		

	drilling line, rotary hose, etc.		
2	Copies of API Certificates & Authorizations (if any)		

Signature _____
Name _____
Designation _____
Date _____

SECTION 5: SOLIDS CONTROL EQUIPMENT

1. MUD & WATER TANK SYSTEM WITH ACCESSORIES:

One (1) Mud & Water Tank System consisting of the following:

1A: Active and Reservoir Mud Tanks: 3 + 3 = Six (6) tanks

- One (1) Shaker tank – minimum 47.5 cum (300 Barrels US)
- One (1) Intermediate tank – minimum 47.5 cum (300 Barrels US)
- One (1) Suction tank – minimum 47.5 cum (300 Barrels US)
- Three (3) Reserve tanks of minimum Capacity 47.5 cum (300 Barrels US) each (i.e. Total capacity: 900 barrels) complete with Mixing Pumps and Mud agitators

1B: Water / Chemical Tanks: Three (3) tanks

1C: Auxiliary Equipment & Accessories for the Mud Tank System:

- One (1) Mud Loading System
- One (1) Mud Pump Super Charger System
- One (1) Feed Pump System for Solid Control System

TECHNICAL DETAILS OF THE ABOVE:

1A: Active and Reservoir Mud Tanks:

Each mud tank should have approximately the following dimensions:
Length: 9900 mm (excluding 300 mm skid extension on each end for tail boarding)
Breadth: 2285 mm
Height: 2250 mm (excluding skid height)

a) Tank Walls: The walls of each of the tanks (including partition walls) are to be constructed, preferably, with 8 mm thick MS crimped plates. Tank bottoms, to be constructed with 8 mm thick plain plates, should be sloped gradually to a maximum of 3" (75.0 mm) towards the tank cleaning doors to facilitate cleaning.

b) Master Skid: The tanks should be mounted on three runner oilfield type skids fabricated from 300 mm beams (ISMB) reinforced with suitable channels and angles. The ends of the skid should project out from the tank by 300mm and curve upwards. 150 NB X Sch 80 pipe with provision for lifting should reinforce the end of the skids for tail boarding.

c) Tank Doors: Two (2) clean out gates should be provided at the rear of each reserve, suction and intermediate tanks and three (3) clean out gates in the shaker tanks.

d) Sand Traps of approx. 10 – 12 cum capacity are to be provided in the Shaker Tanks. Approx. 3" (75 mm) slope is to be maintained towards the clean out gate end.

e) Valves and Couplings: Dresser type pipe couplings, butterfly valves and dumb valves with flanged ends should be provided.

f) Mud Channels and gates: Mud channel with diversion gates should be provided in all the tanks per the mud system requirement.

g) **Water, Mud and Equalizing Lines:** Square tubings of sizes 152 X 6 mm and 101 X 6 mm shall be used for Mud rolling line and Water rim line respectively. Equalizing lines (273mm) should be provided between shaker tank and intermediate tank with dresser type pipe couplings for end connections. These lines should be provided with suitably placed manifolds / isolating butterfly valves and gates etc. for separation or isolation of tanks or tank in the system. The rim line water tapping for mud system shall be with 1" NPT vertical insert and a plug (2 nos. for each tank). Suction lines of 250 mm (10") nominal dia with butterfly valves and Dresser type pipe couplings for two nos. of mud pumps should be provided in the Suction Tank and in the Intermediate Tank. The suction valves and suction valve system shall be supplied with 10" NB X 6.3 mm thick pipes. Mud hopper suction line of 200mm (8") nominal dia. with butterfly valve and Dresser type pipe coupling should be provided in the Suction Tank and all the reserve tanks.

h) **Tank Top, Handrails and Staircases:** All tank top open spaces should be covered with iron serrated bar gratings (Heavy-duty grills) and should have sufficient support and fixing arrangements to ensure stiffness and ruggedness. Removable handrails at least 1 metre high with two-rail railings and 0.15 metre high toe board should be provided on the open side of the tanks per safety standards. All handrails should consist of top rail, knee rail and tick board. Stairways of 1000-mm width and 45 degree maximum angle with handrails as described above on both sides should be provided at convenient places for climbing on to the tanks from ground level and from cable tray to suction tank. These staircases shall be resting on the walkway and also wherever possible be permanently attached / anchored to the tanks. All tanks should have fixed staircases without handrails from tank top to tank bottom for going into the tank. The walkway arrangement shall be Folding type flush with tank top.

i) **Tank Volume Measuring Scale:** All the tanks should be provided with permanently attached measuring scale made of anti-corrosive metal / alloy graduated in inch and foot to indicate volume per inch height.

j) **Bottom Mud Gun:** On the low pressure mud rolling lines a sufficient number of bottom mud guns complete with nipples, pipes, butterfly valves, hammer unions and a handle to rotate the gun from tank surface etc. should be provided in all the tanks.

k) **Mud Agitator:** Each mud tank shall be equipped with mud agitators so positioned to have proper churning of mud, each complete with flameproof electric motor(s) of suitable hp (to be specified by the bidder) which shall operate on 415 Volts, 3-phase, 50 Hz AC power supply. The mud agitators should be of aerofoil design impeller and heli-bevel type gearbox. The turn-over rate of the agitators should be around 50 seconds.

l) **Provision for Mounting Solids Control Equipment:** Provision should be kept for mounting / installing solids control equipment on the shale shaker and intermediate tanks. Two (2) shale shaker units, placed side by side, with shale slide will be mounted on the Shale Shaker Tank; one (1) Desander unit mounted on shaker tank and one (1) Desilters unit mounted on suction tank; one (1) vacuum degasser unit will be installed on the shaker tank. The required partitions, outlets with 200mm (8.0") butterfly valves and dresser type couplings should be provided in the shale shaker tank and intermediate tank for operating all these solid control equipment and degasser in the mud system. The skid with feed pumps to all these equipment should be placed in front of the shale shaker/ intermediate tank near their interconnections. A common manifold for suction and delivery of the feed pumps for solid control equipment is to be provided with isolating valves to use either of the two pumps to feed Desander, Desilter or degasser.

m) **Surface Preparation/ Sand Blasting/ Painting:** All oil deposits should be removed by using approved de-greasing agents with special attention to drilled holes, bolt holes etc. The tanks

shall be sand-blasted and painted with one coat of inorganic zinc primer 70 microns in thickness and two coats of Repack high build polyurethane.

n) Electrical Earthing System:

(i) Each mud tank should have two nos. of GI straps 50 X 6 mm mounted on the out side of the walls facing mud pumps and mud mix skid side.

ii) The straps 50 X 6 mm should be welded to the sturdy supports that are welded to the tank wall. The gap between tank wall and strap: 50mm. Spacing between supports: 1000mm. The strap length should be the same as the tank length/ width. Gap between straps should be 150mm.

iii) Holes to be drilled in each strap are: (a) one no of 15mm dia. hole near each agitator (b) two nos. of 15mm dia. holes with a spacing of 100mm near each strap end.

iv) Straps should be mounted at a convenient height for ease of connection.

v) Galvanization of the straps should be of the high quality to withstand the corrosive environment. 2 nos. each 25 X 3 mm GI strips shall be welded to the main strips and the agitator skids (approx. perpendicular to the main strips 50 X 6mm).

vi) Two (2) GI straps of size 50 X 6 mm shall be suitably mounted on each skid to facilitate independent double earthing of the pump motors.

vii) Holes to be drilled in each strap are: a) two nos. of 15 mm dia holes with a spacing of 100 mm near each motor b) two nos. of 15 mm dia holes with a spacing of 100 mm near each strap end.

viii) Foldable type hangers should be mounted on tank wall below the earthing straps to support the mud system cables. Spacing between hangers should be 1000mm. Width of the hangers: 300mm

o) Mounting of Push button station: Mounting assembly for push button station of each mud/ water tank agitator to be welded to the tank near respective agitator assembly.

p) Mud Pill Chamber: A chamber of approx. 10 cu m (63 bbls) capacity with isolating valves should be provided inside the suction tank for preparation of special mud pills. A suitable sized agitator of stainless steel 304 Aerofoil 3 blade design of approx. dia 36" coupled with flameproof electric drive motor of maximum 10-hp capacity should be provided in this chamber for proper mixing of the mud additives. The pill tank agitator is to be such that it should not foul with the bottom/ internal piping. This chamber should be connected with the suction line for the rig pumps and also with an independent line from the mud loading system with isolating valves.

q) Chemical Operator's Cabin: One (1) cabin of size approximately 4.2 m long x 2 m wide x 2.5 m high skid-mounted cabin with proper heat insulation & ventilation, complete with one sliding door, safety glass windows, adequate provision for keeping mud testing equipment and accommodating 2 (two) persons, and with tool box, oilfield mud balance such as Baroid and MF viscometer. The cabin should be placed near the intermediate tank at the level of the walkways.

1B: Water / Chemical Tanks:

Three (3) water / chemical tanks fabricated as detailed above for item 1(A) and having approx. dimensions:
Length: 9900 mm (excluding 300 mm skid extension on each end for tail boarding)
Breadth: 2285 mm
Height: 2250 mm (excluding skid height)

The following features should be provided in the water / chemical tanks: -

- Two tanks should have open top and one tank should have covered top with two manholes.

- Both the open top tanks should be covered with the serrated floorings as described above at 1A(h).
- 2" line size hopper shall be fabricated and assembled on one open tank. The maximum height of the hopper shall be limited to the height of the mud agitator and should not exceed 3400 mm.
- Small, rugged, collapsible type platforms of preferable size 2000mm (L) x 2000mm (B) x 500mm (H) should be provided near the hopper to stack a few sacks of chemicals prior to loading.
- All the three tanks should be provided with strongly built sturdy ladder both from inside and outside the tanks. Handrails are to be provided for the two (2) open-top tanks with bar grating platforms and walkway between the two tanks.
- Two (2) clean out gates should be provided at the rear side of each tank. These gates should be provided with 12" Butterfly valves. Approx. 3" (75mm) slope is to be maintained towards the clean out gate side.
- All the tanks should be provided with 100mm drain out plug at the floor of the tanks.
- The open tanks should be provided with permanently attached measuring scale made out of anti-corrosive metal / alloy graduated in inch and foot to indicate volume per inch height.
- The inlet feed line shall be supplied with 100mm (4") Sch.40 ASTM 106 Grade 'B' pipes with butterfly valve and should be anchored firmly with the sidewall of the tank. The rim line water tapping for water tanks shall be with 1" NPT vertical insert and a plug (2 nos. for each tank).
- All the tanks shall be provided with 152.4mm (6") Sch.40 ASTM 106 Grade 'B' pipes with butterfly valve in the front side of the tanks.
- The open top tanks should be provided with bottom guns at four sides of the tanks with rotating (180^0) facility from the tank top.
- Each open-top tank should be provided with two (2) agitators having heli-bevel type gear box .The mud agitators shall be with stainless steel 304 Aerofoil 3 blade design of approx. dia 36". The agitators should be driven by maximum 10 hp, 415 volts, 3-phase, 50 Hz horizontal foot mounted, squirrel cage rotor induction motor with bi-directional cooling fan at NDE. The motor should be fully enclosed fan cooled and offering protection to IP55. Insulation: Class F but the temperature rise should be limited to that of Class B. Earthing: Two nos. of earth points on the enclosure and one no. inside the terminal box. Termination: Motors should have terminal box with studs for connection of supply cable. Canopy: Motors should be provided with a removable type canopy for protection against rain. Canopies should be supported on agitator skids. Paint: Motors should be painted with epoxy paint of DA Grey shade

The overall height of the tanks including the agitators should not exceed 3400 mm for transport limitations.

Two (2) horizontal multistage centrifugal pumps set complete with piping/ Dresser type couplings and butterfly valves should be mounted on an independent three runner oilfield skid. These pump sets will be used to load chemicals through hoppers to water tanks, to gun the mixture and to feed chemical-mixed (gauging) water in the cement hopper for preparation of cement slurry. The two horizontal multi stage centrifugal pumps should have cast steel body, bronze / cast iron impeller, EN 8 shaft with gland type packing and each should be capable of developing 150 m. of head. The discharge of each pump should be about 60.0 m^3 / hr at 1450 rpm.

1(C): Auxiliary Equipment & Accessories for the Mud Tank System:

I. Mud Loading System: One (1)
II. Mud Pump Super Charger System: One (1)
III. Feed Pump System for Solid Control System: One (1)

I. Mud Loading System:

The following equipment should be mounted on an oilfield three runner skid and top floor with inter connections through piping, dresser type couplings and butterfly valves:

a) Centrifugal Pump sets: Two (2) centrifugal pumps of Mission Magnum – I or equivalent make of size 8" x 6" x 14" with approx. 12.1/2" size impeller. The mud mix system shall be provided with 10" suction valve system with 8" suction header.
Each pump will be coupled to a 75 hp, 415 Volts, 3-phase, 50 Hz 1500-rpm flameproof weatherproof electric motor. The motors, starters and the cable glands should be suitable for use in hazardous areas and duly certified by CMRI (UL or the equivalent certifying authority of the country of origin)and approved by DGMS for Zone I and Gas group IIA & IIB of Oil Mines.
The bidder should submit copies of CMRI certificates (UL or the equivalent certifying authority of the country of origin) & DGMS approvals for all the flameproof electric motors, starters and cable glands with the quotation.

b) Loading Hoppers: Two (2) hoppers shall be provided for Bentonite / Barite loading. One hopper should be suitable for use for loading barites and the other hopper coupled with one (1) High Performance Aqua–Shear Jet Shearing / Mixing System capable of handling 1000 GPM of fluid, should be suitable for loading polymer chemicals. The Jet shearing system shall be provided with hopper having 4" line size on a separate skid which shall be placed by the side of / parallel to mud mix skid. The inlet and outlet of the jet shearing system shall be connected to one of the mud mix hopper lines with necessary isolation valves.

II Two Mud Pump Supercharging System:

Two (2) 8" x 6" x 14" size Mission Magnum – I or equivalent pumps with approx. 12.1/2" impeller should be suitably positioned and mounted on a three runner oilfield skid and floor with inter connections through piping, dresser type couplings and butterfly valves to super-charge the mud pumps suction. Gap between supercharger system and mud tank shall be approx. 900 mm to facilitate / ease of slinging of supercharger skid. The supercharger system shall be provided with 10" isolation Butterfly valves and 10" suction header.
Each pump will be coupled to a 75 hp, 415 Volts, 3-phase, 50 Hz 1500-rpm flameproof weatherproof electric motor. The motors, starters and the cable glands should be suitable for use in hazardous areas and duly certified by CMRI (UL or the equivalent certifying authority of the country of origin)and approved by DGMS for Zone I and Gas group IIA & IIB of Oil Mines.
The bidder should submit copies of CMRI certificates (UL or the equivalent certifying authority of the country of origin) & DGMS approvals for all the flameproof electric motors, starters and cable glands with the quotation.

III. Feed Pump System for Solid Control System:

Desander, Desilter and Degasser Feed Pump Set: Two (2) 8" x 6" x 14" size Mission Magnum – I or equivalent pumps with 12.1/2" size impeller should be suitably positioned and mounted on a three runner oilfield skid and floor with inter connections through piping, dresser type desilter and degasser units. Gap between mud mix system and mud tank shall be approx. 900mm to facilitate / ease of slinging of mud mix skid.
Each pump will be coupled to a 75 hp, 415 Volts, 3-phase, 50 Hz 1500-rpm flameproof weatherproof electric motor. The motors, starters and the cable glands should be suitable for use in hazardous areas and duly certified by CMRI (UL or the equivalent certifying authority of the country of origin)and approved by DGMS for Zone I and Gas group IIA & IIB of Oil Mines.

The bidder should submit copies of CMRI certificates (UL or the equivalent certifying authority of the country of origin) & DGMS approvals for all the flameproof electric motors, starters and cable glands with the quotation.
All components of the tanks should be new, unused and free from all defects.
The tanks should be hydraulically tested for 24 hours.

2. MUD LOADING SYSTEM/ BARITES RAMP:

One (1) Mud Loading System / Barites Ramp of 600 – 800 sq. ft. area and 4 ft high for placement adjacent to the Active Mud System, with shade over the ramp for storing Bentonite, Barites and other bulk chemicals

3. TRIP TANK:

One (1) trip tank, 10 cubic metres (62 barrels) capacity with two nos. centrifugal pumps with fps gauging system visible from Derrick Floor.

4. PRE-FLUSH TANK:

One (1) pre-flush tank, 15 cubic metres (100 barrel) capacity for cementing jobs, preparation of soaking solution, etc.

5. LWC TANK:

A standard LWC Tank, Capacity: 15 cubic metres (100 barrel) approximate capacity with connection to Suction & Pre-flush tanks

6. SHALE SHAKER:

Two (2) units of Linear motion "High G" (Minimum 7G) shale shakers with suitable flow divider & mounted side by side on a rugged oilfield type master skid over the shaker tank, each unit of LMSS rated at 500 GPM and capable of running up to 250 plus mesh size screens without overflowing. (The units of LMSS should not be permanently fixed on to the skid but should be designed for easy attaching & detaching on to the skid).
The dimensions of the master skid & LMSS unit should meet the transportable dimensions stated in Section – 11.

7. DESANDER:

One (1) 2-cone Desander with manifold constructed of 8" Sch 40 pipe, mounted the third shaker, having two (2) 10" polyurethane cones with grooved end inlet and overflow, Desanding Capacity: 1000 GPM minimum.

8. DESILTER:

One (1) Desilter Assembly, 16-cone with manifold constructed of 8" Sch 40 pipe, mounted on an angle iron base, having sixteen (16) 4" cones with grooved end inlet and overflow, Desilting Capacity: 1000 GPM minimum.

9. VACUUM DEGASSER:

One (1) Vertical Vacuum Degasser, mounted on oilfield skid, with one (1) 5 hp, 230 /415 Volt AC, 3-phase, 50 Hz explosion-proof motor, starter, complete with suction and discharge piping, jet nozzles, etc. Degassing Capacity: 1000 GPM minimum.

10. "POOR BOY" DEGASSER:

One (1) "Poor Boy" mud gas separator mounted on oilfield type skid having chequered floor plates; with inlet from flow line and choke manifold, one outlet, one drain, one 8" vent and one 20" man way
Diameter: 48"
Should be of adjustable height to match the system.

11. TOOLS & SPARE PARTS FOR SECTION 5:

Following additional spares in specified quantity as indicated should be supplied along with the unit. Specific description, part nos., make, etc. and unit price (in commercial bid) of each and every item shall clearly be indicated in the bid.

- Bidder to quote set of handling & special tools (for screen replacement, vibrator replacement, deck / basket angle adjustment, cone replacement, etc.) required for carrying out operation, repair & maintenance on Shale Shaker, Desander & Desilter including one torque wrenches & one digital accelerometer (vibration meter). Bidder must forward a list of such tools quoted by them indicating the make & model. **Price of these should be indicated in commercial bid & will be considered for evaluation purpose**.

- Bidder to quote for the following Shale Shaker Screens of nearby mesh size, Desander & Desilter spares to be procured along with rig package. **Price of these should be indicated in commercial bid & will be considered for evaluation purpose**.
  20 mesh - Quantity 30
  40 mesh - Quantity 30
  60 mesh - Quantity 40
  80 mesh - Quantity 40
  100 mesh - Quantity 40
  150 mesh - Quantity 40
  175 mesh - Quantity 30
  220 mesh - Quantity 30
  250 mesh - Quantity 30
  Desander cones, complete – 5 Nos.
  Desilter cones, Complete – 10 Nos.
  Victaulic Clamps with seals for Desander cone – 10 Nos.
  Victaulic Clamps with seals for Desilter cone – 20 Nos.

- Two extra sets of vibrator motor & starter of Shale shaker.

- High pressure – low volume suitable water jet cleaner with all accessories – 1 No. (for cleaning the shale shaker screens - OPTIONAL). **Bidder to quote the specification with price in commercial bid & will be considered for evaluation purpose.**

SECTION 6: RIG INSTRUMENTATION & CONTROL

1.0 INSTRUMENTATION FOR CARRIER

1.1 GAUGES, METERS ETC. IN DRIVER'S CABIN

The following minimum instruments shall be provided in driver's cabin with proper identification plates:

a) Speedometer with Odometer (KM calibration)
b) Engine Oil Pressure Meter with low pressure warning buzzer
c) Engine Temperature Meter with high temperature warning buzzer
d) Engine Hour Meter
e) Engine Tachometer
f) Air Pressure Meter with low pressure warning buzzer
g) Ampere Meter
h) Transmission Oil Pressure Meter with low pressure warning buzzer
i) Transmission Oil Temperature Meter with high temperature warning buzzer

1.2 DOCUMENTATION

The following documents shall be submitted along with the bid for bid evaluation:

a) Detailed diagram of the pneumatic and electrical system.
b) Layout drawing of all the sensors, instruments along the carrier.
c) Technical leaflet of each instrument & sensor fitted in the carrier along with the make & model.
d) List of instrumentation maintenance spares for two year maintenance.

2.0 INSTRUMENTATION FOR ENGINE & TRANSMISSION

2.1 INSTRUMENT PANEL FOR ENGINE

The following minimum instruments shall be provided in driver's cabin:

a) Lube Oil Pressure Gauge
b) Fuel Pressure Gauge
c) Oil Filter Differential Pressure Gauge
d) Cooling Water Temperature Gauge
e) Electronic Tachometer
f) Service Meter
g) Exhaust Temperature Gauge
h) Engine starting switch with key
i) Engine stopping switch from Drivers cabin & Drillers console
j) Emergency air shut off switch from Drivers cabin & Drillers console

2.2 SAFETY SWITCHES FOR ENGINE

The following minimum safety instruments shall be provided in the engine:

a) Low lube oil pressure switch with alarm
b) High water temperature switch with alarm
c) Over speed switch with alarm
d) High inlet air temperature switch with alarm
e) High lube oil temperature switch with alarm
f) Air inlet shutoff
g) Manual shutoff control
h) Emergency stop push button

2.3 Air Dryer: The air dryer shall be suitable for producing instrument air having dew point -40°C. Necessary timer control circuit along with solenoid valves, diaphragm operated valves and pressure gauges etc. are to be provided along with the dryer. Detailed catalogue, literature & drawing etc. are to be provided along with the offer.

2.4 Air compressor:
Air compressor control shall be PLC based and comprise of the following minimum safety instruments:
a) Compressor auto on/off control
b) Compressor load/unload control
c) High discharge pressure switch
d) High discharge temperature switch
e) High lube oil temperature switch
f) Low lube oil pressure switch
g) Low cooling water pressure switch
Note: Detailed catalogue, literature & drawing etc. are to be provided along with the offer. Licensed software for PLC should be supplied along with the material.

2.5 Air receiver:
Air receiver should include the following minimum instruments:
a) Safety valve.
b) Pressure gauge.
c) Auto drains facility.
Note: Detailed catalogue, literature & drawing etc. are to be provided along with the offer.

2.6 Allison Transmission
a) Allison 4th generation electronic control system.
b) Wiring diagram of the control system is to be provided along with the offer.
c) Layout diagram indicating the physical position of all the sensors, controllers etc to be provided along with the offer.
d) List of items used in the control system including sensors, controllers, solenoid valve etc. along with part nos. and maintenance manuals for the sub-units to be provided along with the offer.
e) Recommended spare parts list of instrumentation and control system for maintenance to be provided along with the offer.
f) Diagnostic Software (Licensed), communication cable and one laptop for Allison controller to be provided along with the material.
g) Parts Catalog, Principles of Operation, Service Manual and Troubleshooting Manual for Allison Control to be provided along with the material.

2.7 Spare Parts: Spares for two years normal operation of instruments fitted in the engine and its accessories should be included in the offer. Item wise breakdown price of spares should also be provided. Bidder should indicate the part nos. against each item along with supplier's part no. if any. The cost of spares will not be considered for price comparison.

3.0 INSTRUMENTATION FOR DRAW-WORKS, MAST & SUBSTRUCTURE

3.1 DRILLER'S CONSOLE:
Driller's console should be complete with instrumentation system to carry out drilling operations smoothly such as air controls for main drum clutch, engine throttle, engine shutdown, transmission, rotary table, catheads, hydraulic controls for auxiliary winch, Emergency engine shutdown system, brake water control etc. Additionally, following minimum instruments should be mounted in suitable

enclosure at Driller's console arranged in such a manner to give clear view of each & every gauge to Driller while operating the draw-works.

a) One (1) Weight Indicator system, Martin Decker Type E or MD Totco Type 50 with sensator. It should be complete with 6, 8, 10 & 12 line dials for 1.1/8" line size
b) Two (2) Standpipe pressure gauges, 0-6000 psi rating
c) One (1) Annulus pressure gauge, 0-6000 psi rating
d) One (1) Rotary Torque Indicator
e) One (1) Rotary RPM Indicator
f) One (1) Tong Torque/ Pull Indicator
g) All controls for draw-works & rotary
h) Two (2) Pump Stroke Counters for Mud Pumps
i) Controls for two rig engines includes start / stop, throttle & Emergency shut down
j) Controls for two mud pumps includes start / stop, throttle & Emergency shut down
k) Start & stop control for mud pump superchargers
l) Control for disc brake
m) Any other instrument as felt necessary by the manufacturer

4.0 DRILLING INSTRUMENTS

a) Monitoring System: Electronic digital monitoring system to be installed in Doghouse should include the following minimum parameters:
   - Flow in GPM
   - Flow out (%)
   - Hook Load
   - Weight on bit
   - Rotary RPM
   - Rotary Torque
   - Rate of penetration
   - Pump Pressure
   - Total SPM
   - Measured depth
b) Mud pit indicator: MD Totco "Mud watch" or equivalent "E-Mud" pit level and flow show monitoring system with alarm device complete with the following minimum features:
   - Total pit volume and individual pit volume
   - Trip tank volume and indicator, 0-100 per cent with 8 hours recorder
   - Mud pit gain or loss
   - Mud flow as percentage of total flow
   - SPM and continuous strokes for each mud pumps
   - Electronic digital monitoring/hard copy printout recording system for total volume and flow line
c) On-line Gas Monitoring System at the primary shale shaker and connected to audible or visual alarm near the Driller's stand
d) One (1) MD Totco or equivalent make 7-pen drilling recorder complete with 24 hour clock & chart and all required accessories including transducers, sensors, cables, etc. to record the following parameters:
   - String Weight in metric system
   - Pump pressure
   - Rotary torque, Electric
   - Rotary table RPM, Electric
   - SPM – 2 Nos.

- Rate of Penetration (ROP), wireless system including draw-works driven rate of penetration assembly

e) Ton-mileage Recorder to be installed in the Doghouse

5.0 INSTRUMENTATION FOR POWER PACK

5.1 INSTRUMENT PANEL FOR ENGINE

The following minimum instruments shall be provided in driver's cabin:

a) Lube Oil Pressure Gauge
b) Fuel Pressure Gauge
c) Oil Filter Differential Pressure Gauge
d) Cooling Water Temperature Gauge
e) Electronic Tachometer
f) Service Meter
g) Exhaust Temperature Gauge

5.2 SAFETY SWITCHES FOR ENGINE

The following minimum safety instruments shall be provided in the engine:

a) Low lube oil pressure switch with alarm
b) High water temperature switch with alarm
c) Over speed switch with alarm
d) High inlet air temperature switch with alarm
e) High lube oil temperature switch with alarm
f) Air inlet shutoff
g) Manual shutoff control
h) Emergency stop push button

5.3 SAFETY SWITCHES FOR GENERATOR

The generator breaker should have the following protection:

a) Low lube oil pressure
b) High water temperature
c) High oil temperature
d) High inlet air temperature
e) Engine over speed

6.0 DOCUMENTATION

The following documents shall be submitted along with the bid for bid evaluation:

a) Detailed diagram of the instrumentation & control system including electronic, pneumatic and hydraulic systems
b) Physical layout drawing of the rig indicating the positions of all sensors, instrumentation systems
c) Technical literature with the make & model of all the instrumentation systems, sensor and sub-units should be submitted along with the quotation.
d) List of instrumentation maintenance spares for two year maintenance. These spares are for reference purpose only & will not be considered for evaluation.
e) DGMS (India) approval for all electrical / electronic instruments to be used in classified Hazardous areas.

NOTE: All the electrical/electronic instruments installed in hazardous area should have valid approval from DGMS for use in Zone-1 & 2, Gas Group IIA & IIB areas of oil mines.

SECTION 7: MUD PUMPS

Two (2) 1000 HP rated Triplex Mud Pumps, **National Oilwell Model 9 P 100 or GD Model PZ-9 or Drillmec Model 9T1000 or suitable equivalent**, each of the following specifications:

Note: Bidders offering equivalent model pumps, other than the three models mentioned above, should have to justify the reliability of the offered pumps with end user certification in original from minimum 3 parties outside country of manufacture. Bidders who have supplied similar or higher capacity pumps to OIL before Bid Closing date need not to provide such certification.

SLUSH PUMPS [Mud Pump]:- Model : OILWELL 9 -P-100 or GD Model PZ-9 or Drillmec Model 9T1000 or suitable Equivalent

Two (02) nos. of triplex single acting, slush pumps with input HP rating of minimum 1000 HP driven by variable AC motors of matching HP rating. Pump should be suitable for continuous heavy duty application.

1. Maximum requirement of working pressure 5000 psi.

2. Pumps should be equipped with easily changeable piston and liner assy. to meet varied requirement of drilling operation.

3. Apart from standard accessories, each pump shall be equipped with 5000 PSI WP pulsation dampeners, charging hose assy., reset relief valve, bleed valves, inline suction stabilizer, jib crane with trolley, pull lift chain hoist, strainer cross etc.

4. Detailed specification of pump motor should be provided.

5. Drive media : Belt Drive

6. AC motor (min. 75 HP) driven TRW Mission (8" x 6" x 14") or equivalent centrifugal pump 02 (Two) nos. for super charging (to handle mud up to 20 ppg) with appropriate independent suction and delivery manifold mounted on an oil field skid.

7. Parallel pumping: In certain events both the slush pumps will be used in parallel pumping. All arrangements should be made available for this purpose.

A. TYPE OF PUMP:

Slush pump triplex single acting; with individual (preferably two-piece) forge steel modules, horizontal piston pump with replaceable cylinder liners of various sizes to obtain desired discharge and pressure at rated SPM, complete with standard equipment, skidded and master skidded with DC/AC motor.

B. CAPACITY OF PUMP:

i)	Input Horse Power	: Max. 1000 HP
ii)	Discharge	: Max. 2440 LPM (644 GPM) at 165 Kg/sq cm (2300 (PSI)
iii)	Discharge pressure	: Max. 351 Kg/sq cm (5000 PSI)

The above parameters are to be obtained with replaceable liners and pistons at maximum rated input HP and speed of the pump. Liners to be fitted on the pump at the time of supply to obtain maximum discharge of 595 GPM (2252 Litres/min.). Parameters are to be based on 90% mechanical efficiency and 100% volumetric efficiency.

C. SLUSH PUMP FEATURES:

i) Fully enclosed steel plate fabrication power end.
ii) Double helical gear for crankshaft gear and pinion shaft gear.
iii) Double extended pinion shaft.
iv) Self-aligning spherical main and pinion shaft bearing, Roller bearing at crank and crosshead end of connecting rod. (Bearing make should be Torrington, SKF or FAG only).
v) Interchangeable standard module (suction and discharge) with shot penned inner surface.
vi) Fast change valve covers.
vii) Two piece fast change piston rods with clamp.
viii) Suction and discharge manifold with suction dampener.
ix) Piston - liner lubricant spray system with AC 3 Ph. 50 Hz electric motor driven pump with reservoir.
x) Pump fitted with super die-hard clamp type liners, premium piston, mission type seats and polyurethane valves assy.
xi) The pump should be complete with all the components of fluid end and power end.

(One hydraulic valve seat puller kit and one set of special hand tools for fluid end maintenance should be included with each pump set to be supplied).

D. ACCESSORIES:

Each mud pump package should be assembled with the following accessories:

I. One (1) Discharge Strainer Cross Assembly complete with suitable strainer, 5" (125 mm) 5000 psi (347 Kg/sq cm) WP discharge flange connection, 4"(100 mm) – 5000 PSI (347 Kg/sq cm) WP top connection for pulsation dampener and 5" (125 mm) - 5000 PSI (347 Kg/sq cm) WP end connection for strainer clean out.

II. One (1) 3.1/2” x 12” vibrator hose

III. One (1) Discharge Pulsation Dampener (Make- HYDRIL Model- K-20-5000), maximum service pressure 5000 PSI, surge capacity 75 Litres (20 gallons). Connections - 4" (100 mm) API 5000 RTJ, Diaphragm – Hydrogenated nitrile or equivalent. Hydril Pt. No- 50500-41

IV. One (1) Pressure gauge (Make- OTECO), 0 - 5000 PSI range with 2" (50 mm) line pipe female connection, and there should be provision to isolate the gauge with a 2" (50 mm) flexseal valve (Make- OTECO)

V. One (1) Manual reset (type-B) relief valve, RR, 3"(75 mm) manual reset 1500 – 5000 PSI (347 Kg/sq cm) WP (Make- OTECO or RETSCO). Retsco Part No. 30825-02 or equivalent

VI. One (1) Charging hose assy. for pulsation dampener

VII. One (1) Jib crane with trolley installed on pump to handle fluid end parts

VIII. One (1) Yale hand hoist, 1/2 ton LH 8 Ft lift, # 0001

E. PUMP DRIVE AND MOTOR SKID:

Single rear mounted V-belt electric motor pump drive for the offered mud pump, including extended skid frame, motor supports, tensioning screws, belt guards to be mounted on the master skid. Pumps are to be fitted with suitable sheaves (including hub) at both sides of pumps. Pump drive should be complete with banded V-belts for use with DC/AC shunt motor and belt guard.

F. PUMP DRIVE DC / AC MOTOR:

Each mud pump shall be driven by one (1) heavy-duty DC / AC Induction motor compatible with the mud pump

All the motors for auxiliary lube oil pump (if any) to be supplied by mud pump supplier should be rated as follows:

Voltage 3-phase, 415 V, 50 Hz. HP will depend on pump but shall be limited to 5 HP for each motor. RPM will depend on pump. Terminal box - fitted with double compression type FLP gland suitable for cable OD 14 mm. Enclosure - flameproof, suitable for use in hazardous area Zone-I gas group IIA & IIB.

G. CONTROL PANEL:

One (1) Control Panel, for operating the Two (2) Mud Pumps, mounted at Driller’s Console including Pump Throttle Valve and Pump Clutch Valve

SECTION 8: POWER PACK (MAIN ENGINES)

Two (2) Power Packs of the following specifications shall be required for the SCR module to power the Mud Pumps, Solids Control Equipment, Rig Auxiliaries, etc:

Each Power pack for the SCR module shall comprise of an Engine coupled with Alternator that should be unitized and enclosed in a weatherproof skid mounted enclosure. The Engine should be:

i) Compatible to power and torque trend (varying loading pattern).
ii) Compatible to SCR control and total rig environment (Ruggedness).

Engine and alternator should be load tested prior to dispatch and shall be commissioned in our field. Technical specifications of Engine and Alternator are as detailed below: -

ENGINE:

Two (2) Nos. (CATERPILLAR Make), Turbocharged, after cooled, four stroke, Air start, electronically controlled Oilfield diesel engines with counter clockwise rotation as viewed from flywheel end , capable of developing net Horsepower of minimum 1250 to 1300 HP at 1000 RPM and should be capable to drive a alternator of 1215 KVA capacity . The engine should be suitable for continuous duty with an overload capacity of 10% for a period not exceeding one hour per 24 hour running. The Engines should conform to specifications IS: 10000 /BS: 5514 or equivalent. Each power pack should be complete with 1215 KVA AC generator for 50 cycles operation. The fuel for the engines should be readily available in India.

(1) Engines shall be compatible to Silicon Controlled Rectifier (SCR) / Variable Frequency AC (VFD-AC) drives and suitable for Land Drilling applications.

(2 Detailed dimensional /GA drawings of the Power pack including Footprint shall be submitted by the bidder along with the quotation

(3) Each Power pack shall comprise of an Engine coupled with Alternator that shall be in unitized condition and enclosed in a single, weather proof, skid mounted Acoustic Enclosure. Engine and Alternator shall be:

a) Compatible to power and torque trend (varying loading pattern), responsive to instantaneous load and torque changes including no load.
b) Easily serviceable in-situ and at outside the well-site Facility.
c) Of up-to-date technology.
d) Shall be able to withstand the shock and vibration associated with the frequent movement of rigs from place to place and also to withstand severe environmental conditions including heat and humidity. The Alternator rotor shall be dynamically balanced and engineered to withstand 125% load over normal load.
e) Shall be manufactured to International Standards and shall meet or exceed BIS, NEMA, IEEE, ANSI etc. requirements.
f) Engine and Alternator shall be load tested prior to dispatch and to be commissioned in Oil India Limited’s drilling location.

(4) The specifications of Fuel to be used by the Engines are as follows:

High Speed Diesel: conforming to IS: 1593
Cetane No: 42.5
Gross Calorific value: 19.480 BTU/lb (10.800 Cal/gm)

(5) The bidder should specify the following information along with relevant performance curves with conditions:

a) Gross Horse Power developed at rated RPM
b) Deduction for Altitude, Temperature etc.
c) Deduction for Fan and ancillary equipment
d) Net HP available at rated RPM & site conditions.
e) Specific Fuel Consumption at rated speed and Power and 110%, 75%, 50% and 25% of full load.
f) Performance Curves of the Engines.

(6) The Noise –level produced by the engine at full load should not exceed 75 Db measured at a distance of 1(one) meter from the source.

(7) **Acoustic Enclosure**: The engine and alternator shall be covered by Acoustic Enclosure. It is comprised of absorptive acoustic sliding perforated panels of 100 mm thickness and shall be free standing, floor mounted, factory built and modular in construction to facilitate easy installation and dismantling. Sliding doors shall be provided on both the banks of the engine for easy access to carry out maintenance and operational activities. Enclosure shall be sound proof, weather proof and environment friendly conforming to the norms of CPCB (Central Pollution Control Board, India) and latest guidelines of Environment Protection Act, 1986 (India).

THE ENGINE offered shall be complete in all respect with the following major components and systems mounted on it:

A) <u>Control System:</u>

Electronic Module control panel (EMCP) with suitable Battery and charging system.

B) <u>Components to be offered with the Engines:</u>

i. Standard Tool Kit –02 sets
ii. Alternator Alignment Tool kit with Instruction Manual-01
iii. Blow-by Measurement Tool kit -01
iv. Fuel Injector Timing setting tool- 01
v. Air Restriction Measurement tool—01
vi. Heavy Duty Digital Multimeter –01
vii. Lube Oil testing Kit-01
viii. Digital Tachometer –01
ix. Belt Tension Gauge –01
x. Laptop with license password for monitoring Engine Parameters.

(8) The engine will be used as prime mover for 1215 KVA AC Generator of the Rig.

(9) The engine offered should be complete with the following components mounted on it:

<u>AIR INLET SYSTEM:</u>
Single stage air cleaners dry panel type with soot filter service indicator, after cooler Core Corrosion Resistant

<u>COOLING SYSTEM:</u>
Thermostats and Housing (Dual Outlet), Jacket Water Pump-Gear Driven, centrifugal, radiator (Industrial), Radiator Guard, Blower Fan, Fan Drive, Fan Pulley

<u>FLYWHEEL & FLYWHEEL HOUSING:</u>
No of teeth on flywheel should be 183 for Magnetic Pick Up. (Details given below) 3050 Hz at 1000 RPM. The magnetic pick up should be mounted on the flywheel housing for speed feed back to AC control module. The

resistance should be 150 Ohms. The pitch of the Flywheel teeth should be compatible with MPU tip, Flywheel Housing SAE # 00, Flywheel, SAE No. 00, SAE Standard Rotation

FUEL SYSTEM:
Fuel pump, Primary fuel filter, Fuel injection & Injection system, Fuel filter, Fuel transfer Pump, Fuel Priming Pump, Flexible Fuel Lines

LUBE SYSTEM:
Crankcase Breather, Oil Cooler, Oil Filter, Shallow Oil Pan, Oil Pan Drain Cover, Air Pre-Lube Pump, Double jet piston cooling. Sump capacity: more than 400 ltrs. (Deep Pan)

EXHAUST SYSTEM:
Spark Arresting Muffler, Exhaust Fittings, Flexible Exhaust Flange & Expander, weld able, Air Shielded water cooled Exhaust Manifold, Elbow Exhaust

CONTROL SYSTEM:
Woodward EG-6PC Actuator RH or equivalent compatible with the offered engine with 4-pin plug/socket should be on governor housing for speed control. Two pins should be shorted at plug end so that the net coil resistance when measured between other two terminals is 33 ohm. The actuator should be able to operate on a DC signal 0 - 200 mA and Voltage range 0 – 7.5 Volt DC
Magnetic Pick-up should be mounted on flywheel housing for speed feed back to Electronic tachometer of control panel. The frequency of magnetic pickup should be 3050 HZ at 1000 RPM and it should be able to produce a signal in the range of 5 to 40 Volts AC

INSTRUMENT PANEL:
Instrument Panel LH 8 Hole.7 Gauges, Oil Pressure, Fuel Pressure, Oil Filter, Differential Pressure, Water Temperature, Electronic Tachometer, Service Meter, Exhaust Temperature

SAFETY SYSTEM:
Hydra-Mechanical Shut off, Low lube oil pressure switch. Range 8-12 PSI (0.5-0.8 Kg / Sq.cm), with Alarm switch for low lube oil pressure, High Water Temperature switch 96 Degree Centigrade with Alarm switch for high water temp, Over speed switch 1180 RPM, with Alarm switch for over speed, High inlet air temp Switch 110 Degree Centigrade with Alarm switch, High lube oil temp Switch 110 Degree Centigrade with Alarm switch, Air Inlet Shutoff, Manual Shutoff Control, LH
All the switches should have 1 NO + 1 NC changeover type contact rated for 48 V, 2A DC. Common terminal of all the protection switches should be connected together and marked with ferrule (No 15).
Normally closed (NC) terminal of low lube oil pressure switch and NO terminal of all other protection switches should be connected together and marked with ferrule (No 14). All the switches should be of oil tight type.

NOTE:
Engine protection wiring should be done with single core 7/0.029 2.5 sq mm 660 V grade. PTFE insulated copper cable; MPU and actuator wiring should be done with two-core 14/0.2 sq. MM. 400 V grade PTFE insulated, tinned copper cable. Screen to be insulated at Engine end.
A flexible metallic conduit of size 30 mm, length 3 meter should be provided with one end fixed near flywheel housing and the other end for termination at existing alternator control box.
Wires marked 14 & 15 of engine protection system, MPU and actuator should be brought out through the conduit for termination at alternator control box .The exposed length of all the cables at terminal box end should be 30 cm. The generator breaker should trip for the following protection of the unit: -

- Low lube oil pressure
- High water temperature
- High oil temperature

- High inlet air temperature
- Engine over speed

The above protection system will be powered by 24 volts DC. All the protection switch should be of 1 NO + 1 NC with changeover type and the contact should be rated for 48 volts, 2 Amps DC.

STARTING SYSTEM:
Air starting motor RH, air pressure 90- 150 psi, Air silencer LH and Vapour Arrestor
Air Driven Pre lube pump

GENERAL:
Vibration Dampener and guard, Lifting eyes, Fumes disposal, Flexible coupling, Coupling hub Explosion relief valve, Engine barring group, Crankcase breather, Crankcase front electronic Tachometer, Heavy duty servicing hour meter, Standard painting of the engine

COMPONENTS TO BE OFFERED WITH THE ENGINE ARE:

Residential spark arresting type muffler capable of removing 55 % of all particles 10 microns or above with piping connection. Details of muffler to be provided by the bidder in the technical bid.
Heavy duty radiator for industrial use, mounted on the base rail with the engine and with blower fan and fan guard for ambient temperature having capacity at least 20% in excess of total heat rejection of the engine. Heat load calculations are to be provided along with the offer for our scrutiny.
Engine must have Inspection ports for individual cylinder heads for easy inspection, accessibility, serviceability of piston rods, big-end bearings, main bearings, cooling nozzles etc.

The engine is to be supplied with all the components & accessories fitted.

OPERATING SITE CONDITION:

The engine should be suitable for operation in desert conditions under the following site conditions –

Engine site temperature	:	41 ^{0}C. (max)
Engine site temperature	:	6 ^{0}C. (min)
Maximum relative humidity at 21^0 C	:	100%
Maximum relative humidity at 35 ^{0}C	:	95%
Maximum relative humidity at 41 ^{0}C	:	70%
Altitude above sea level	:	150 m.
Average annual rainfall	:	343 cm.

SPARE PARTS:

Spares for two years normal operation of engine and its accessories should be included in the offer. Item wise price of spares should also be provided. Bidder should indicate the part nos. against each item along with supplier's part no. if any. The cost of spares will not be considered for price comparison.

PARTS CATALOGUE, OPERATION / INSTRUCTION MANUAL & DRAWING, TECHNICAL INFORMATION & BULLETIN:

The supplier should provide twelve set of parts list, operations manual & service manual covering all the items of each engine, alternator, flexible coupling, alignment tools & its accessories along with the delivery of the material. Technical details of the engine, alternator governor, spark-arrestors are to be provided along with the offer.

The supplier should provide the layout diagram showing position of engine, alternator and enclosure on the skid along with the offer. The supplier has to provide installation diagram of the complete set including performance curve along with the offer for our technical scrutiny. The bidder shall furnish technical data sheets and dimensional drawing along with the quotation.

The supplier should provide the following information along with the offer –

a) Dynamic load
b) Static load
c) Unbalance load
d) Complete internal wiring diagram of the engine

TEST CERTIFICATE

The Power Packs shall be load tested at the Manufacturer's Works & Test Certificates thereof shall be provided along with the delivery of material.
The nature of after sales services, which can be provided by the successful bidder during initial commissioning as also in subsequent operation, should be clearly indicated.

Supplier's categorical confirmation regarding compliance with the inspection / test procedure and other terms and conditions detailed above is very essential. Offers will be liable for rejection in the absence of such confirmation.

Deviation in respect of any specification as detailed above should be highlighted with technical calculation / catalogue/literature etc.

SECTION 9: RIG ELECTRICALS

Contents:

ELECTRICALS OF THE RIG : BROAD OUTLINES

Electrical Scope of the rig shall encompass complete Design, Engineering and Manufacture, Supply, Commissioning and Testing of the different electrical equipment/drives to be used in the rig with their connected loads. In addition, all current/ latest statutory Indian and International rules and regulations applicable shall be mandatory in design, engineering, application and commissioning.
The electrical system of the rig shall be complete in all respect. All equipments specified below shall be new, unused, of recent manufacture and free from all manufacturing defects. Equipment should be of proven design, and running successfully under similar conditions of operation.
Bidder/ supplier should integrate all supplied equipment and systems and functionally test the complete setup.
In case any of the following equipment/ items is outsourced, bidder shall clearly indicate country and company of origin.
All documents, technical drawings, manuals, literatures, brochures etc. pertaining to the equipment below shall be in English language (UK or US).

The following chapters give the detailed specifications for the Rig Electricals.

CHAPTER I: SPECIFICATIONS OF ITEMS/EQUIPMENT

A. GENERAL:

Mud pumps and other auxiliary electrical system of the rig shall be powered by captive power packs consisting of turbo-charged diesel engine driven alternators. Number of power packs should commensurate with the total power to be consumed during full drilling operations with all auxiliary systems including power requirement for the site camps. The power packs shall be suitable for generating alternating voltage at 600 V, 50 Hz (cps).

Control system for the power packs and all electrical drives, lighting loads and auxiliary electrical system shall be housed inside a power control room (PCR). Various drives & equipment of the rigs will be powered from the PCR by electrical/ electronic/ digital signal, power and control cables.

A suitable integrated & proven rig control system (electronic, PLC based) shall be used to enable the driller to:

- Control the Main drives and auxiliary drives from his cabin/ control panel
- Communicate among various drives and the driller and monitor/ offer real time status of various parameters including engine/ alternator status, motor drives status, current, voltage, power etc. along with the major drilling parameters.

The Electrical System of the rig should be broadly designed to operate the following major equipment:

a) Power Packs (2 nos.)
b) Mud pumps (2 nos.) with 1 no. each SCR controlled separately excited DC drilling motor

In addition, the Electrical system shall also operate the auxiliary electrical equipment as detailed below.

Features of the Control System

i) The control system shall include the main driller's control (D'CON) with control switches to control power packs, main drive motors and various indication meters, speed controllers, display screen and display of alternator/ engine parameters, PCR converter/ inverter fault/ status etc. In addition, fault storage facility and history/ trend data should be available in the system with built-in self-diagnostic features.

ii) **The control system should be complete with all necessary software, hardware and remote communication capability. All software, including hardware keys (if needed) should be licensed to Oil India Limited. Such Licenses should not have expiration dates.**

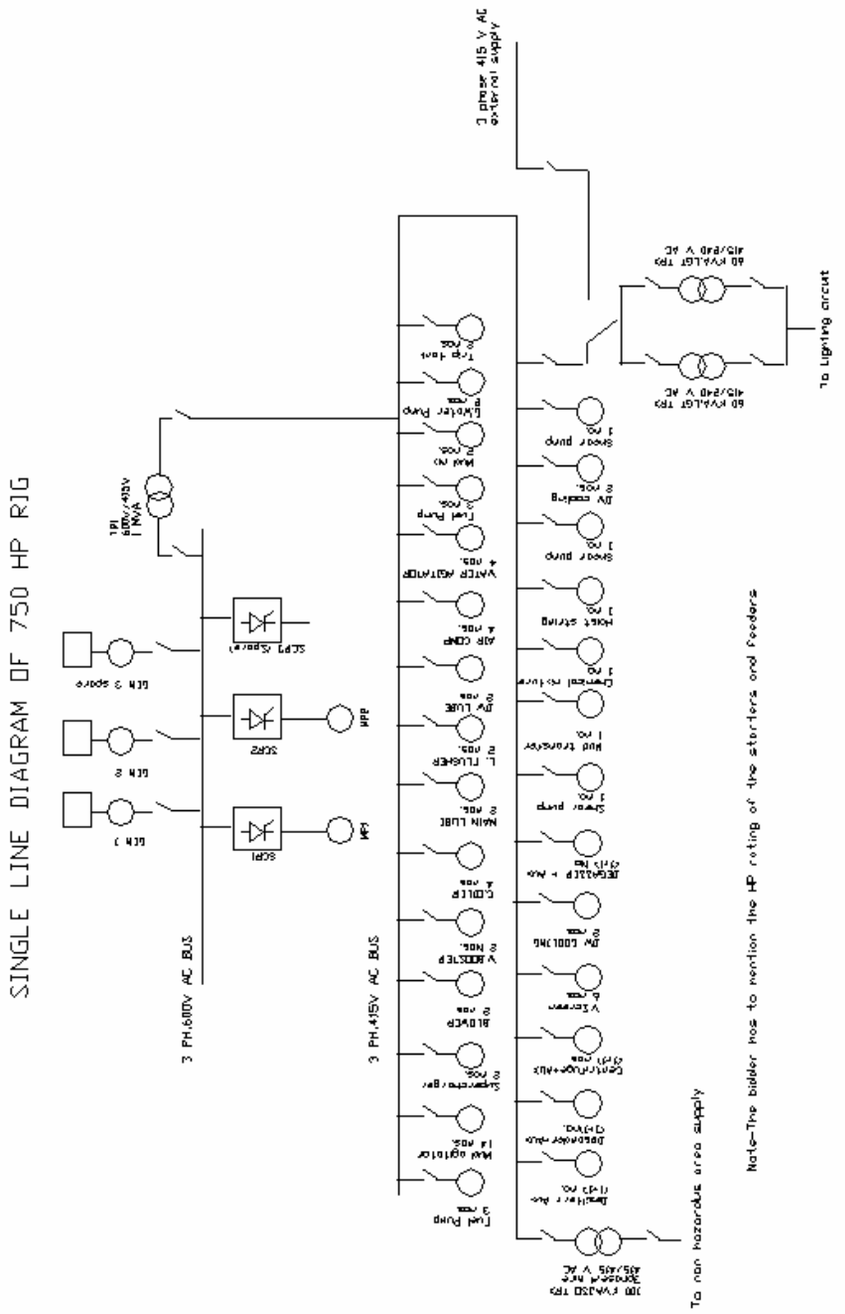
iii) **In case of failure of PLC controller system/ communication, the rig control system will be provided with a standby/backup manual system option, preferably with hot redundancy changeover, for emergency drilling operation.**

iv) The control system shall also include two Emergency Stop controllers for facilitating emergency stopping of major equipments, one for stopping the main DC drives (SCR units) and the other for stopping the power packs (for total rig shutdown).

v) The PLC controller to be used shall be suitable for communication with remote consoles and other rig components and devices. In addition, fault storage facility and history/ trend data should be available in the system with built-in self-diagnostic features.

vi) The control system shall be field proven, running successfully for a minimum of 3 (three) years in land drilling rigs. Bidder shall submit credentials/ certificates from users to this effect along with the bid.

vii) In addition, auxiliary electrical systems for operation of the rig, viz., all electrical motors of the solid control system, rig lighting system, utility system (compressed air, water etc.), cable system including cable trays, boxes & grasshopper/ elevators, earthing system, maintenance and testing facility for control (digital/PLC) system, complete spares etc. shall be available with the rig.



I. A: Power Pack

Qty.: 2 (two) nos.
Engine coupled with the alternator shall be unitized and enclosed in a weather-proof, acoustical, skid mounted enclosure. Power packs shall be

i) Compatible for varying loading pattern, quick responsive to instantaneous load and torque changes
ii) Suitable for SCR controlled DC drives
iii) Easily serviceable both at site and at workshop

Illumination of the Enclosure of the Power Pack:

1. Fluorescent tube fittings shall be provided at suitable places (4 Nos., 2 x 40 Watts) for complete illumination of the interior of the power pack. Light fittings shall be Industrial type, weatherproof (IP65), corrosion-proof/corrosion-resistant and heat-resistant luminaire with transparent cover, suitable for ceiling/ suspension mounting application. The fittings shall be vibration resistant and complete with all accessories. Only fittings of reputed make shall be used, e.g., Philips/ Crompton Greaves/ GE. Fitting shall be stroboscopic type.
2. 3x 1.5 mm2 screened, EPR insulated, CSP sheathed copper cable shall be used for wiring of the light fittings. Light fittings & Cables shall be secured properly to the walls/ ceiling of the enclosure of the power pack, with provision for dismantling, in case the engine or alternator needs to be replaced. Proper glands will be used for entry of cables.
3. One metallic distribution box, fitted with 4 nos. of sockets (16 A, 415 V, 3 phase, 5 pin) – sockets internally looped- shall be fixed at a suitable height (above 1.8 m) on one side of the power pack. 4 nos. matching plugs shall be provided (one plug as incomer from the source, one no. as outgoing to other power packs, and 2 nos. for the 4 light fittings).

Complete power packs shall be load tested prior to despatch and to be commissioned in field. Technical specifications of Engine and Alternator are detailed below:

***I.A.1 Engine*:** Detailed specifications of the engine are available in Section – 8 [POWER PACK (MAIN ENGINES)].

Engine control system shall be integral to the engine. The system shall be complete in all respect including controlling/ operation, protection features with emergency shutdown etc.
Electronic load sharing governor with speed adjust, idle/run switch, and isochronous/droop switch shall be provided with the engine control panel.

I.A.2 Alternators:

The Alternators shall be of heavy-duty construction, designed for drilling applications, which require heavy duty motor starting and predominantly non-linear loads such as SCRs /Variable Frequency Drives. The alternator shall be able to withstand the shock and vibration associated with the frequent relocation of drilling rigs, as also to withstand severe environmental conditions including heat and high humidity. Rotors should be dynamically balanced and engineered to withstand 125% over nominal speed.

Alternators should be manufactured to international standards and should meet or exceed BIS, NEMA, IEEE, ANSI and IEC requirements. **Bidder to confirm standards followed in design and construction**.

The power packs shall be compatible with suitable control system housed inside the Power Control Room (PCR).
The alternators (with the engines) shall be suitable for parallel operation.
The following are the minimum specifications for the alternator

Alternators shall be able to generate continuous **minimum** 1215 KVA at 600 Volts AC, 3 phase, 50 Hz, 0.7 p.f. lagging, at 1000 rpm to meet rig requirements. Detailed specifications are as follows:

1.	Rated voltage	600 VAC
2.	Capacity:	Minimum 1215 kVA (850 kW at 0.7 p.f.)
3.	Power factor	0.7 lagging
4.	Phases	3 phase,3 wire star connected with isolated ungrounded neutral, but neutral available at terminal box
5.	Frequency	50 Hz
6.	Speed	1000 RPM

7.	Duty	Continuous at 50 deg. C ambient
8.	Insulation Class	H for exciter, rotor and stator, resin vacuum pressure impregnation
9.	Enclosure	Open drip proof IP23 minimum, Terminal box IP44 minimum
10.	Temperature rise	80 deg. Celsius at full load and max. ambient taken as 45 deg.
11.	Space heater	One no., single phase, 240 VAC, 50 Hz
12.	Temp. detector	RTD type, six nos. (two per phase), preferably Copper/ Platinum having 10 Ohm/100 Ohms resistance at 25 deg. Celsius, all uniformly spaced along the stator periphery
13.	Surge suppressor	Transient surge suppressor, MOV type connected across rotating rectifier bridge output
14.	Type of cooling	Forced air type blower fan on DE
15.	Bearing	Independent two bearing design, re-greasable type
16.	Alternator waveform	Deviation factor : 5 % max Crest factor : 1.41± 0.07 Form factor : 1.11 ± 0.05 Harmonics content : 3 % max. (total) : 2 % max (individual)
17.	Voltage regulation	Voltage regulation shall be within ± 2%
18.	Voltage balance	With balanced loads, the voltage to be held within 1.0% between Phases

Constructional Features:

1. The alternator should be mounted in a single skid with the engine.
2. Rotor shaft shall have double bearing support.
3. Damper bars shall be brazed to damper winding ring and all the joints in the damper winding ring shall be brazed.
4. Drip proof enclosure and drip proof removable cover for exciter shall be provided.
5. Terminal box shall be of termite and dust proof construction with removable cover.
6. Stator leads shall be terminated on suitably rated copper straps (standoff connectors) for connection to load side.
7. Two non-corrosive stainless steel ground pads mounted diagonally opposite each other on generator frame shall be provided.
8. Plate for main cable entry should be of non-magnetic materials to avoid heating by generation of eddy currents, as single core power cable will be used for termination.
9. Insulation barrier should be provided to separate power and control terminals.
10. Two nos. eye bolts for lifting the machine should be provided on the main frame.
11. Channel mounted terminal block shall be provided for terminating the following-
    a) RTD Leads b) Exciter field leads c) Space heater leads d) Engine actuator leads, if required e) Magnetic pickup leads, if required f) Engine protection system leads
12. Two nos. of single core 300 sq. mm cables are to be used for each phase.
13. One no. 20 pin Amphenol/ Pyle National make socket (Part no ZREP-20-332 PN) with male pins to be provided on lead terminal box. Socket to control TB connection will be done with twenty core control cable of 2.5 mm2 CSA.
14. Cable glands shall be provided for safe and proper entry of the following cables (Number of glands is shown against the cable size).
    - 1 x 300 sq. mm power cable with outer diameter 35-36mm – 6 nos.
    - 3 x 1.5 sq. mm screened cable with outer diameter 14-15 mm – 2 nos.
    - Flexible metallic conduit for engine protection wiring with outer diameter 30 mm- 1 no.
15. All the terminals shall be labeled properly.

Technical Notes:

A. The offered alternator should **similar to Kato model 17190 [Model 850-685351121 (C061-6619), Catalogue/ code no. 6P63150**
B. Complete power pack should be load tested prior to dispatch and to be commissioned in field.
C. Reports of following standard commercial tests performed on the offered alternators (in accordance with IEEE Std. 115, NEMA MG-1, or MIL-Std. 705 standards) ***shall be attached with the technical bid***.
   - Resistance on all windings (cold)
   - Insulation resistance on all windings
   - High potential test on all windings
   - Open-circuit saturation curve
   - Voltage balance on windings
   - Current balance on windings
   - Phase sequence
   - Mechanical balance (vibration)
   - Circulating current (when applicable)
   - Three-phase build-up short-circuit (conducted if the generator has a PMG or SBO)
   - Voltage transient at rated kVA (voltage regulation, stability, and response)
D. ***Bidder shall submit the datasheet of the offered alternator along with the technical bid***, which shall include the data of the offered alternator. The following shall also be mentioned:
   I. Overload capacity: In percentage along with short-circuit capability
   II. Phase unbalance capacity (negative sequence component)
   III. Efficiency at 25%, 50%, 75%, 100%
   IV. Permissible vibration limit: In micron & mm/sec for bearing & foundation pad
   V. Radial & axial clearance for DE / NDE bearings: Maximum & minimum tolerable clearances

   Any other relevant details may be mentioned.

I B: Power Control Room (PCR)

Power control room shall house controls for main drives and auxiliary drives of the rig.
Features:

- Shall house the following:
  - Generator control panels, thyristor (SCR) drives, field and auxiliary motor control panels [auxiliary motors of DC drilling (Mud pump) motors, solid control system, air compressors, water pumps etc as shown in the single line diagram of PCR]
  - One Main transformer (capacity 1 MVA)), 2 nos. lighting transformers and 1 no. isolation transformer
  - Aviation (white) light controller
  - 3 Phase Motor Control Centre
  - Plug socket compartments for interconnection with various main and auxiliary loads.
  - Any other electrical system necessary for operation of the rig electrical equipment, if required
- Outdoor type, weather proof
- Transportable, steel house on self supporting oil field type skid, suitable for bottom lifting

PCR shall have the following dimensions for the structure (not including projections due to door handles, rain protection canopies, light pole brackets etc).

Limiting Dimensions: Length 9.0 mtrs. x Width 3.0 mtrs. x Height 3.5 mtrs.
Limiting weight: 26.0 Tonnes
(Note: The skid should be four runner type & the spacing between the middle runners to be kept more for better stability)

Constructional features:

The power control room should be an out door, weather proof, transportable steel housing with self-supporting skid suitable for oil field application and should not be weighing more than 26 Tones.

PCR should be designed for lifting from the bottom. In addition to this top lifting arrangement may also be provided.

PCR house columns and ceiling frame to be constructed from structural steel seam welded. The outside shall be fabricated from twelve-gauge sheet steel. All corners are to be formed by bending leaving no sheet edge exposed. Roof of the PCR should have proper slopes so that no water logging takes place during rainy season.

Walls to be insulated with three-inch thick polystyrene block insulation. The floor and the wall with the receptacles and plugs will not be insulated. The inside surface of the walls will be finished with a sandwich style insulating board three eight's of an inch thick with white pebble coating on the interior side and aluminum foil on the exterior side. A rubber neoprene mat should be provided over the **full floor area of the house.**

Bus bars should also be accessible for maintenance, if required. PCR panel line-up should be such that the PCR is load balanced for easy lifting, with CG in the centre.

Plug panel for the Generator and DC motor cables to be provided on the front side plug panel (side facing the DW). In case it is difficult to provide generator plug panel on front side then standard arrangement of supplier i.e. generator plug panel recessed type on the side facing power packs can be provided but height of the plug panel should be around 1.5 mtrs from bottom of the PCR.

Fluorescent lighting fixtures (2 x 40 Watt) is to be provided for interior lighting. Four- (4) numbers of 240 volt Phase – Phase duplex receptacles (suitable for Indian style plug pins) to be included, two at each end of the house. The PCR shall be equipped with two portable (for working in panels) emergency lights which shall adequately light up the PCR in the event of a blackout. Additionally, two emergency lighting fixture with EXIT signs to be also included at each end of the House.

Two- (2) doors with anti panic hardware will be furnished - one at each end and on opposite sides of the house. Both doors shall be designed to open to the outside by pushing on the crash bar. Doors should have a rubber sealing lining.

Suitably sized and rated spreader bars and slings shall be provided with the PCR for bottom lifting.

Surface preparation: Surface finishing should be Commercial Metal Blast Grade (SSPC-SP-6) 1.5 to 2.5 mils anchor profile before primer painting. Primer and final top coat shall be of premium quality. Top coat colour will be urethane linear white.
Over all dry film thickness of the painting should not be less than 8 mils (200 microns).
Surface preparation and painting shall be adequate for the harsh rainy & humid environmental conditions.

The PCR shall be fitted with adequately rated tinned copper bus bars, insulated with sleeves, cable alleys/trays and vertical bus chambers.
Hardware for all bus connections shall be of stainless steel bolts, aircraft type locking nuts with nylon inserts suitable for bus bar operating temperature at full load or alternatively hardware with plain & spring washers to be used.

Major components of PCR:

a) PLC System

The programmable logic control panel shall perform the following minimum functions and have the features for overall SCR control, interlock with accessories and monitoring.

- The System Host PLC shall be a high speed, versatile modular PLC. The PLC to be used shall be suitable for serial communication with remote consoles and other rig components and devices.
- All SCR drives will be on a common communication link with the PLC which will allow the user to monitor all SCR bays on the touch screen.
- The PLC system shall have provision for twisted pair cable for communication with the remote Racks in Driller & MP Console. If required signal repeater shall be provided. The controls including PLC should be suitable for the maximum required distance from PCR to Driller Console.
- The PLC shall have provisions for interfacing with the LAN. Interface with controls and indicators of the driller's console via the field I/O units. PLC shall provide status, alarm and diagnostic tools via local annunciation functions. PLC will provide automatic starting of Mud Pump auxiliaries with indicating lights on console. The supercharger pumps shall be started & stopped manually from Driller's Console.
- PLC shall have touch screen display panel (at the PCR) for all miscellaneous indications for all generators & all SCR panels, indications for various drives, ground faults, power limits, Driller assignment, Hour meter, current & voltage metering, trending of historic data & faults etc.
- PLC cubicle should be provided with CVT of adequate rating to avoid any effect of SCR system harmonics.

Components of the PLC system:

The PLC system shall mainly consist of the following:

- Modular Mini-PLC **(preferably Siemens S7-300)**
- 32 Bit, Fixed & Floating Point CPU
- Up To 1024 Digital Inputs / 1024 Digital Outputs
- Up To 256 Analog Inputs / 256 Analog Outputs
- Complete Instruction Set With "Built-In" Functions
- Built-In Self Diagnostics
- System Status & Alarms When Used With Remote Display Screen
- Fiber Optic Communication Capability
- Remote Graphic "Touch" Screen Display

Touch Screen:
A touch screen/soft button display screen should be provided in the PLC cubicle. The following represents data to be displayed preferably on multiple screens.

Miscellaneous indicators

PLC System Communication OK
Generator ON (For each Generator)
Ground Fault
Power Limit
Driller Console Assignment

SCR Indicators (To be repeated for each SCR panel)

SCR ON
Bridge Temp Switch
Blown Fuse
Bridge Current meter
Bridge Voltmeter
Speed Reference
Contactor Assignments
% Power Limit

Mud Pump Indicators

MP 1, MP2 Field ON
MP 1, MP2 Chain Oilers ON
MP 1, MP2 Main Lubes ON
MP1, MP2 Blowers ON
MP 1, MP2 Liner Flushers ON
Charging Pump 1 ON
Charging Pump 2 ON
MP1, MP2 armature current

Generator Cubicle Indicators (Repeated for each Generator Cubicle)

Running Hours for Power packs

b) Generator control panel

The control for power pack engines (ECM – Engine Control Modules) should be integral to the engine (detailed specs for control of power packs are available elsewhere in this document). The input from the alternator control panel to the ECM shall be indicated by the bidder
Generator control panel shall be suitable for operating/ controlling/ protecting the generator. The generator control system shall be suitable for control of the generator, individual running or paralleling & load sharing with other power packs. There shall be one alternator control panel per alternator with one additional spare panel, complete in all respect. All control switches, devices, and meters should be available on the front fascia of the panel.

Generator control panels are to be fitted with the following:

i) Generator control unit (package) –for operation, control, metering and protection of–alternator
ii) Voltage regulator with voltage adjust rheostat
iii) Withdrawable type incomer air circuit breaker of sufficient nominal rating, breaking/ withstand and making capacity, manually chargeable, electric closing, with solid state trip unit, UV release and necessary auxiliary contacts. Breaker should be interchangeable with SCR converter panel breakers.
iv) Breaker ON/OFF pushbuttons
v) Engine control switch OFF-IDLE-RUN (this switch shall duplicate with the OFF-IDLE-RUN switch in engine control panel).
vi) Meters- Analog Ammeter and Voltmeter with selector switch, power factor meter, KW meter, KVAR meter, Generator Hour meter, Alternator Temperature meter, engine actuator current meter. **However digital display for all the parameters may be offered as an ADDITIONAL option.**
vii) Indication lamps-Gen. RUN, Gen. ON-LINE, Gen. SYNCH, Gen. FAULT, Engine FAULT
viii) Control Transformers, fuses, links, terminal blocks etc.
ix) Any other Electronic control system for remote communication with other devices/ equipment
x) Synchronizing controls consisting of reverse power relay, synchronizing lights and switch- on one panel only (if the synchronizing control system is placed in one of the generator panels)

Each panel should be fitted with the following meters

- Alternator Ammeter 0-1500/2000 A (selectable for all three phases)
- Alternator Kilowatt meter 0-1500/2000 KW
- Alternator Kilovar meter 0-1500/2000 KVAR
- Alternator power factor meter (–)1.0 – 0 – (+)1.0
- Alternator On-line lamp

- Alternator running lamp
- Engine cumulative running Hours meter
- Alternator temperature meter and switch

Voltage regulator with the following-

- Electronic AVR
- The voltage regulation is to be limited to 3% droop (Max.)

Suitable kVAR load sharing scheme should implemented. Bidder to indicate scheme / type of load sharing employed.

Alternator Protection features:

The alternator protection features include:

- Overcurrent – Set to trip at 110% of max. rated current
- Overvoltage – Set to trip at 116% of alternator terminal voltage (600 V), with 10 mSec. delay
- Overfrequency – Set to trip at 110% (i.e. 55 Hz) of rated frequency (50 Hz)
- Underfrequency – Set to trip at 42 Hz (16% below rated)
- Reverse Power – Set to trip at 8-10% of rated kW

Each alternator-engine control panel should be independent and complete in all aspects with switching and control devices. Loss of one panel should not affect the others. However, they will communicate with one another for load sharing.

PLC input – The alternator indications (including breaker status) should also be available on the PLC HMI display at the PCR.

c) SCR (Thyristor) Panels

The PCR shall house minimum 3 (three) nos. of SCR panels of sufficient capacity. The SCR Control system and bus bar shall be suitable for driving two Mud pumps (each mud pump driven by one DC motor).

SCR controlled drive panel should preferably be of standard NOV/Ross Hill design with analog DC regulator modules for shunt motors. All motors will be 1000 HP/1250 HP, 750 V DC, separately excited shunt wound motors of BHEL 4903CX / GE 752R models.

All necessary protection like SCR heat sink over temperature, over current suppression etc should also be incorporated in the respective panels.

Each SCR panel shall consist of the following main equipments:

- **1600 A** (indicative) rated ACB rated 600V AC, 3-pole, 50 Hz, 65 KA with adjustable trip, Draw-out type. Each breaker to be manually Chargeable, electrically closed and electrically tripped and with auxiliary contacts.
- The SCR Panel circuit breaker to be directly interchangeable with the Generator incomer circuit breaker. (The SCR breakers will have the same auxiliaries as the generators.)
- Voltmeter, 0-1000 VDC
- Ammeter, 0-2000 ADC
- SCR "ON" indicating lamp, (Red) LED type
- Logic circuit with LEDs
- 6-pulse, 2000 amp @ 750 VDC, vertical forced air (with blower fan) cooled SCR Bridge. The bridge shall be protected using semiconductor type fuses with form C contacts, which are activated when the fuse opens.

- Surge Suppression "ON" Indicating Lamp (Green) LED type.
- AC bus surge suppression module to clamp any transient voltages that may be damaging to the SCR devices- the surge suppressor to consist of a fused enclosure of metal oxide varistors (MOVS). Each SCR panel should have individual surge suppression MOVs connected in Delta mode.
- Set of DC contactors. DC contactors should be suitable to break full current at rated power. GE Series IC2800 or Siemens Type 700 contactors shall be provided. Supplier to furnish full details of the proposed contactors.
- Cubicle Space Heater (To be “ON” when SCR is not in operation)
- Analog DC Module of Ross Hill design for shunt motors for firing control of the SCR drive. Full details of analog DC modules to be furnished along with the offer.
- 3 phase 600 V AC twin blower unit for cooling of the SCR bridges. SCR panel operation to be interlocked with blower. In case blower failure takes place during SCR working, SCR breaker to trip.
- The rating of the blower must be adequate for proper cooling of the SCR bridge. Bidder to mention the rating of the blower motor with the offer.
- Field interlocks such as field loss contacts etc to be included in the system design so that operation cannot be done in case field loss relay does not pick-up.
- Drive / assignment fault alarm should be available in the PCR with external electrical hooter.

Communication & Input/ Outputs:

- Programmable analog and digital inputs, outputs, relay outputs
- Trouble indication: automatic memory / enquiry from software
- Hardware I/O connection for safety and monitoring functions
- Communication interface with driller’s control/ cabin

d) Field Supply Cubicle

Field supply cubicles [preferably Ross Hill make] shall also be housed in the PCR for external field supply units for the DC motors.

Mud pump field supplies shall be designed to facilitate operation of both motors. Field supply transformers should have tappings for adjustment of field current of the DC motors. Required fused protection for transformer primary and secondary should be provided.

Field currents & voltages should be adjustable/ selectable to match the DC motor requirements of various makes of motors (BHEL 4903CX / GE 752R models).
DC motor Field supplies shall also have Hands-Off-Auto (HOA) switch to facilitate energizing of field supplies without assigning drilling function. In Auto mode required MCC interlocking should be built into the field supply circuits to ensure that field is energized only after DC motor blower (and in case of pumps, lube/ flusher/ oiler systems) picks up.

All field supplies shall have independent DC ammeters on the cubicle door.

The field supplies should have the following features:

- Shunt Field Over temperature protection and alarm
- Field or cable short fault alarm and shut down
- Field or cable open alarm and shut down.
- On-board LED display for setup and monitoring
- Adjustable/selectable field settings

The equipment to be consisting mainly of the following:

- Hand-Off-Auto selector switches for field supplies
- Field current ammeters for all motors
- Padlock Lock Out Devices

e) Hands Off Cranking Circuit (HOC)

The HOC shall supply power for the engine starting circuit and the pulse pick-up circuit in each of the engine generator modules with the following:

- 2 nos. – 12 VDC batteries
- 1 no. – Battery charger PC card
- 1 no. – Double pole circuit breaker

f) Synchronizing system

One Synchronizing switch shall be provided with positions for each generator, bus and off. This should be visible from all alternator control panels, and allow each alternator to be brought on-line. The panel shall feature the following minimum instruments:

- Synchroscope
- Synchronising lamps – clear (dark lamp synchronizing)
- Voltmeters for incoming generator and running (bus)
- Frequency meters for incoming generator and running (bus).
- Synch. Check system to check either two phases or there should be additional phase sequence check

Sync Check Relay:

There shall be a synch-check relay to allow alternator to be synchronized with the bus. The circuit breaker "close" signal shall be interlocked with this relay.
Synchronization system may be placed in one of the generator panel front fascia or independently.

g) Power Limit Controller

The Power Limit Controller is to be provided to monitor the KW & KVAR/current of each of the engine – generator sets. If either of these parameters reach its limits, the Power Limit Controller shall reduce the power being delivered to the loads, so that the load on each generator is held at its limit until the loads on the SCR drives are reduced (by other action) to a level below the generator limit. The Controller will allow for adjustment of each parameter independent of the other.
The range of adjustment will allow the Power Limit to be lowered to 80% or raised to 110%.

h) Ground fault detection system

Ground fault detection system consisting of the following items;

i) *600 VAC ground fault detection*
Ground fault detection circuit, 3 nos. ground fault lights (for each phase), percentage AC ground fault meter

ii) *DC ground fault detection*
DC ground fault detection system with percentage DC ground fault meter (+/0/-), test pushbutton

iii) *415 VAC (AC auxiliary bus)- with NGR system*

All ground fault alarms shall be audio as well as visual.

In the 415 V auxiliary bus, IT system of neutral grounding with maximum ground fault current limited to 750 mA using suitable NGR as per IE Rules is to be used. All breakers, MCCB, MPCB shall be suitable for IT system as per IEC 947-2. The neutral shall not be served and supply from the 415 V MCC bus shall be 3 Phase & 3 Wire.
CBCT type earth leakage relays are to be used in the output of the main supply transformer, contacts of which will be used for ground fault alarms.

For 415 VAC system, individual earth leakage devices shall be provided in each starter/feeder panel.

i) Air conditioning

The PCR will be air conditioned and humidity controlled. The ambient air is expected to vary from 0 Deg C to 55 Deg C.
The AC system should have 100% redundancy, i.e., half the capacity should be standby at all time.

The air conditioning for the PCR shall be properly sized and air conditioning units located to take into account the **heat generated by internal equipment in full load conditions in high ambient locations**.
The temperature inside the PCR should not exceed 25 deg C under any circumstances
The humidity should be considered for a maximum of 98%.
Bidder to furnish details of Air Conditioners

j) Driller's control console (D'CON)

Driller's control console or D'CON shall be an integral part of the rig control system.
The D'CON should consist of the following minimum controls and display functions. It shall have an HMI at the driller's control panel to enable the driller to monitor and control the entire drilling operation.

- Control switches and speed controllers to control main drive motors
- Indicators and meters
- Display screen for display of alternator/ engine parameters, SCR converter status/ alarm etc.
- Supercharger pumps shall be started & stopped manually from Driller's Console.

PLC shall provide diagnostic tools via local annunciation functions.

In case of failure of PLC controller system/ communication, the rig control system will be provided with a standby/backup manual control system option for emergency drilling operation. The backup select option shall be provided in the D'Con.

The D'Con shall also include two Emergency Stop controllers for facilitating emergency stopping of major equipments, one for stopping the main DC drives (SCR units) and the other for stopping the power packs (for total rig shutdown).

k) Transformers (Power, lighting/ air-conditioning and isolation)

These shall be specially built dry type class 'H' insulated, copper wound Dry-type transformers. Impedance shall be matched to 5 percent. The transformer shall be used to power the auxiliary AC bus of PCR for supplying the auxiliary AC loads (Details of loads are given later-*"Annexure- MCC Starters/ Feeders"*).

The transformers will operate in places of high moisture and high dust. The enclosure should be adequate for these conditions. The transformer, in its enclosure shall also be able to withstand vibration of moderate to severe levels.

Specifications:

i) Main Transformer:

1 no. main transformer, copper wound, air cooled to meet the auxiliary motor/ Air conditioner and lighting / other load requirement as described in the starter/feeder list of PCR.

- Capacity – 1000 kVA minimum, continuous rating
- Voltage – 600/415 volts
- Vector Group – Dyn11, Star connected secondary
- Frequency – 50 Hz
- Phases – 3 phase
- Impedance – 5% for connection
- Ambient temperature – 50 Deg C
- Temperature rise above ambient – 115 Deg C. The transformer shall not exceed this temperature rise when operating continuously at full load capacity.
- Insulation – Class H (or 220 Deg C)
- Cooling- Air Natural cooled
- Rated power freq. withstand – 3 kV (RMS) or better

Standards – Indian Standard IS: 11171/ or equivalent international standard

Primary and secondary side terminations:

1. Three nos. of single core cables for 600V side and three nos. of single core cables for 415V side.
2. Size of cable: 1x 300sq.mm flexible copper with O.D. -36mm for all phases.
3. Stand off copper termination (termination using copper flats) shall be provided. All cable lugs shall be terminated using removable nut and bolts.

The transformer shall be supplied through suitably rated MCCBs in the primary and secondary sides.

The Transformer shall be placed at suitable positions, taking into consideration working space, socket board positions, equal distribution of weight of the PCR etc.

ii) Lighting supply transformers for mast and rig lighting (hazardous area lighting):

2 nos. lighting supply transformer [fed from the main 415 VAC bus of PCR], Minimum 60 KVA, dry type, 415 V/ 240 V phase-to-phase, 50 Hz, copper wound, air cooled to meet the lighting load, as per the following broad specifications:

Quantity – 2 (Two) transformers
Capacity – 60 kVA each, continuous rating
Voltage – 415/240 volts (Phase-to-Phase)
Frequency – 50 Hz
Phases – 3 phase
Impedance – 4%
Vector Group – Dyn11, Star connected secondary, neutral available for connection
Enclosure – IP23 type, with provision for natural circulation of cooling air.
Ambient temperature – 55 Deg C
Temperature rise above ambient – 80 Deg C
Insulation – Class F
Rated power freq. withstand – 3 kV (rms) or better
Standard – Indian standard IS: 11171 (Bidder to confirm)

Primary and secondary side terminations:

1. One no. of 3 core, 35 mm2 cable for 600V side and one no. 3 core, 35 mm2 cable for 240V side.
2. Stand off copper termination (termination using copper flats) shall be provided. All cable lugs shall be terminated using removable nut and bolts.

The lighting transformer secondary shall be connected to a suitable lighting distribution board, located on the MCC.

iii) Isolation Transformer:
1 No. 100 kVA dry type isolation transformer with the same specification as the lighting transformers, except the following:

Quantity – 1(one) transformer
Capacity– 100 kVA, continuous rating
Voltage – 415/415 volts, Dyn11, neutral available for connection.

The isolation transformer shall be used to supply the general rig area lighting, crew camp supply and auxiliary loads which need a 240 V phase-to-neutral connection. Neutral of the isolation transformer shall be grounded solidly.
Primary and secondary side terminations:

1. Two nos. 3 core, 35 sq. mm cable for 415 primary side and two nos. 3.5 core, 35 mm2 cable for 415 V secondary side.
2. Stand off copper termination (termination using copper flats) shall be provided. All cable lugs shall be terminated using removable nut and bolts.

iv) All the transformers shall be supplied through suitably rated MCCBs in the primary and secondary sides.
v) All live parts of the transformers not insulated shall be protected adequately.
vi) Transformers shall be placed at suitable positions, taking into consideration working space, socket board positions, equal distribution of weight of the PCR etc.

l) Motor control center (MCC)

The starters as given in *"Annexure- MCC Starters/Feeders"* are to be incorporated in the PCR. Physical line-up of the MCC panel shall be opposite to the generator/SCR/field panels.
Motor control center or MCC shall be fed from the auxiliary 415 AC bus in PCR (fed from the secondary of the main 1000 KVA transformer) through a suitably rated MCCB. This MCCB shall be 4 pole for supplying the TPN bus. As "IT" system of neutral grounding shall be used (detailed below), neutral will not be served. However, neutral bus is to be retained.
The bus system shall consist of tinned copper bus, bus chamber and cable alleys in a suitable arrangement. Panels shall be in vertical configuration. Busbars shall be adequately rated. A voltmeter and 'bus bar live' indicator lamp shall be provided to indicate the bus status. Bus shall be accessible for maintenance. Bus bars should be insulated.

Various auxiliary motor drives, PCR lighting and air-conditioning system shall be supplied from the MCC panel through switchgear.

MCC specifications:

i) MCC starter panels shall be suitably rated to cater to auxiliary electrical drives. These shall be draw-out type panels, containing suitably rated MCCBs, contactors, thermal overload relays, earth leakage circuit breaker, ammeter, OLR reset push button, Hand-Off-Auto selector, indication lamps etc.
ii) Automatically controlled starters for blower motors and mud pump lubrication/auxiliaries have facility of manual start / stop from panels. A selector switch Auto-Off-Manual shall be provided for these starters. The interlocks of blower starters and mud pump lubrication/auxiliaries shall be available for interlocking in respective main DC drive controls. All other starters are operated from push button station mounted near the respective drives. Superchargers shall have on/off control at D'CON.
iii) Components shall be mounted on sheet steel base and all apparatus shall be suitable for front removal. However, ammeters and indication lamps may be mounted on panel doors. MCCBs, HOA, ELCB reset, PBS reset switches etc. shall be suitable for operation from outside, without opening the panel door. Starters shall be provided with individual cubicle; however 2-4 Feeders can be combined in one cubicle.
iv) All the starters for AC motors (except LMSS/LMMC, BOP, Bug blower & centrifuge) irrespective of rating are to be housed in the MCC panel of power control room and only push button stations with On/Off

controls are to be located near respective equipment. All motors and push button stations will be directly connected to the power control room through individual cables and plug sockets.

v) When the selector switch is in "Auto" position, an initiating contact from DC drilling motor starting control circuit shall start the auxiliary motor. In the "Hand" position, the motor shall be started immediately without any interlock.

vi) Each individual starter panel/lighting/ AC unit feeder panel shall be provided with an earth leakage circuit breaker which shall cut off the power supply in case of an earth fault in that particular circuit. Trip setting should be at 300 mA.

vii) All breakers/ MCCBs used in the MCC shall be suitable for IT system as per IEC 947-2 / IS 13947. All breakers, MCCB, MPCBs used in the MCC shall be suitable for disconnection and shall have positive visual isolation. The neutral shall not be served and supply from the MCC bus shall be 3 Phase & 3 Wire.

viii) IT system of neutral grounding shall be used in the PCR. As per IT system, line to neutral supply cannot be used and hence individual control transformer (415V/110 V) shall be provided for each starter panel. Earth leakage protection shall be provided on the secondary side of the control transformer for all starters with external/remote PBS for protection of PBS circuit from earth leakage. Control Transformer secondary should be connected to ground.

ix) **Broad Specifications:**

- Bus voltage – 415 Volts AC
- Bus current (nominal) – 2000 Amps (indicative)
- Bus material – Copper bars, insulated
- Spare cubicles – As per list
- Cubicle type – Drawout
- Bus Fault Level –Suitably rated

x) **MCCBs for starters/ feeders**- All starters and feeders shall have individual MCCBs as incomers, fitted with a RCD, as the primary device for protection and isolation except those started with the soft starters. However, for the soft starter started motor groups, there will be a single incomer MCCB per group, with sufficient current carrying capacity for simultaneous running of all motors in the group at full load. There shall be one soft- starter for a group of maximum 4 (four) similar sized motors. **Fuse systems instead of MCCB will not be accepted.**

MCCBs shall be connected to the Busbars through copper bus links.

Features –

- The MCCBs should be suitable for DOL motor starting (Induction motors) for all motors below 55 KW/ 75 HP.
- Control supply of individual starters shall be tapped from its own line, the starter shall be in-operative if the MCCB is off.
- The MCCB shall have clear ON/OFF/TRIP positions.
- The MCCB should have facility for time delayed-Overload protection (adjustable 0~10 sec, 0.4~1.0 In), Short circuit protection (10 In), and RCD (earth leakage detection device) with trip setting of 100 mA and 300 mA selectable
- MCCB should be of Line-Load reversible type.
- Operating handle should be accessible from the exterior of the MCC cubicle, with the door shut.
- The MCCB will be of fixed mounting type.
- Starters above 55 KW/75 HP shall be provided with a soft starter, with suitable contactor arrangement.
- All the power cable terminations are to done with proper colour coded terminal blocks (R phase (phase-1)-Red, Y phase (phase-2)-yellow, B-phase (phase-3)-Blue

In addition, all starters shall have at least the following protection/ features:

- Contactor
- Remote (Push Button Station) PBS/ Hand Off Auto feature as required
- Control Circuit voltage shall not exceed 110V
- Control Circuit including Remote PBS shall have earth leakage protection

The selection of MCCB, contactors and relays for the starter panels shall be as per Type 2 co-ordination (IS 13947 or IEC60947).
All components fitted in the starter panels should be preferably of a single make.

Each motor panel should have the following minimum components located on the front fascia

- One overload reset button,
- MCCB operating handle / lever with TRIP, ON, OFF positions marked,
- LED Indication lamps (with LVGP feature) for motor ON/OFF/OVERLOAD,
- Selector switch for HAND / OFF / AUTO for required starters
- One ammeter to indicate motor current

All MPCB/MCCB shall be suitable for secondary injection testing of tripping characteristic by a test kit.

xi) **Rig Lighting Supply:**

Secondary side of the lighting transformers (415/240 VAC, phase-to-phase, supplied from the AC main 415 bus) shall be connected to the 3-phase rig lighting DB through a TP MCCB of suitable rating. The lighting DB rating shall be sufficient for supplying the full rig and mast lighting. All outgoing feeders from the DB shall be 240 VAC, phase-to-phase, 2-pole MCB units, with built-in residual current protection (RCBO), tripping at 300mA.

xii) **PCR Lighting and air-conditioning supply:**

The feeder for PCR lighting/air-conditioning supply, supplied from the 415 VAC bus, shall be connected to a TPN DB through a TP MCCB of suitable rating. The TPN DB rating shall be sufficient for supplying the air-conditioning units (total connected) and full PCR lighting.

xiii) **Internal Cabling**
All internal wiring of the MCC starter panels shall be done with 1.1 KV grade fire retardant PVC insulated tinned copper multi-stranded flexible cables with proper lugs.

Bidder shall submit a complete and detailed list of all auxiliary electrical drives required for operation of the rig.

xiv) **Push Button Stations**
Push Button Stations shall be provided, containing Emergency Stop / Lockout pushbuttons, Local-Remote and Start-Stop push buttons for local control of Electrical equipment. The PBS should have facility for lockout of the motor in order to enable maintenance work to be done. All PBS should have IP66 type protection and canopies for rain shade. All PBS should satisfy requirements for installation in Zone 1 Hazardous area, Gas groups IIA & IIB.

m) Plug and Socket Panels

Suitable plug and socket arrangement shall be provided for interconnection of the PCR with alternators, motors, auxiliary loads, PLC remote interfaces etc. with cables. Socket compartments shall be suitable for ease of quick rig-up and rig-down operations. Matching plugs will be fitted in the cables.
Socket compartments should be located to either end of the PCR. Alternator and DC motor power and control cable socket board shall be towards the derrick. However, the socket board for auxiliary motors may be placed on either end of the PCR. In case AC units are situated in the end, auxiliary motor may be placed

in the side of the PCR. The plug / socket compartments shall be well illuminated and suitably marked for ease of identification of circuits / loads.
The plug sockets cable termination shall be crimped type. Horizontal steel bars shall be provided in the compartments for supporting the layers of cables.

Apart from the above, a spare set of 3 single core 1000 A sockets shall be provided in the main socket board, which will be wired up from the 600 VAC main bus through a suitably rated MCCB.

n) Type of Earthing:
IT system of neutral grounding with maximum ground fault current limited to 750 mA using suitable NGR as per IE Rules is to be used. All breakers, MCCB, MPCB shall be suitable for IT system as per IEC 947-2. The neutral shall not be served and supply from the main MCC bus shall be 3 Phase & 3 Wire.
Main Transformer output shall be provided with a Residual Current Monitor (RCM) for indication/ alarm. Scheme, Type, Make and Model of RCM shall be approved by OIL.
Alternatively bidder may offer ungrounded system with insulation monitoring device. However, earth leakage detection and tripping not exceeding 300mA is required in all starter/feeders.

o) NGR System:
A single NGR on the neutral bus shall be provided. The NGR system shall have the following features:
- Maximum earth fault current is 750 mA
- Restricted earth leakage protection at 1000 kVA transformer star connected secondary

NGR shall be provided with a Permanent Insulation Monitor (PIM) and NGR monitoring device of reputed make (Bender RC48N or equivalent) with audio alarm in the PCR for monitoring NGR continuity and leakage current. Scheme, Type, Make and Model of PIM shall be approved by OIL. NGR scheme shall have to conform to National/International standards.

I. C. DRIVE MOTOR SPECIFICATIONS:

I. C. 1: MUD PUMP DRIVE DC MOTORS

DC drilling motor suitable for heavy duty slush pump application
Quantity: Total 2 nos., 1 each for 2 mud pumps
Type: Ex-p, pressurized enclosure, suitable for use in hazardous atmospheres, Gas groups IIA & IIB.
Electrical rating: 750 V DC motor, 1000 HP (indicative, minimum)
RPM at continuous horse power: **To be specified by bidder**
Temp. rise: Class H
Duty: Continuous drive with constant torque, at 55 Deg. Centigrade
Stator insulation: Class H
Bearing: Two heavy duty roller bearing, re-greasable

Motor should be complete with the following:
- Main terminal box with IP56 protection
- Differential pressure switch for pressure sensing
- Blower assembly with suitable capacity explosion proof blower motor, 415 VAC, 50 Hz rated
- Space heater

Make: BHEL 4903CX/ GE make DC drilling motor GE752

I. C. 2: AC AUXILIARY MOTORS

Bidder shall submit list of all AC auxiliary drive motors.

Motors shall be rated for 415 Volts 3 phase AC, 50 Hz supply. All motors are to be flameproof /explosion-proof, weather proof and conforming to IP65 suitable for use in Zone 1 & 2, Gas groups IIA & IIB [as per Indian & European (CENELEC) Standards] or Class 1, Div. 2, Gas groups C & D [North American Standards] Hazardous areas of oil mines.
Motors to be used in the Hazardous areas of the rig, as classified by DGMS (India), shall be approved by DGMS (India) for use in such areas.
Motors shall be fitted with FLP/Exp double compression cable glands, terminal studs and earthing leads for connection to common earth bus.
Plug-in type connections are not permissible at motor end.

I. D.: CABLES

Various sized cables shall be used for connection of alternators of power packs, Drilling motors, AC auxiliary motors, lighting fixtures, D'CON, electronic control system and its components. All cables shall be suitable for use in oil field environment.

All cables to be used in Hazardous areas of oil mines should be approved by DGMS (India).
Refer Electrical Annexure-Statutory for details of cables.

a) Alternator power cables, DC motor power cables, main transformer cables shall be single core, multi-stranded, flexible, 1100V grade, unscreened copper cables with EVA (Ethyl Vinyl Acetate rubber) insulation and EVA (Ethyl Vinyl Acetate rubber) sheath. These cables should be heavy duty, acid, oil and abrasion resistant, flame retardant.

b) Auxiliary AC motor/ 3- phase electrical equipment cables shall be multi-stranded, 1100 V grade, flexible, ethylene-propylene rubber (EPR) insulated, HOFR elastomeric CSP sheathed, either individually or collectively copper screened, 4 core copper conductor cables with fourth core having 50% conductivity of the largest conductor and the combined screen having 50% conductivity of the largest conductor. Cables shall be of various cross sectional areas to suite different ratings of motors/ equipment. All terminals shall be properly crimped.

c) Control cables shall be 2.5 mm2 cross-section, 1100 V grade, EPR insulated and HOFR elastomeric CSP sheathed, copper screened flexible multi-stranded copper conductor having cores up to 20. Each individual core should be identifiable by means of colour / number and each core terminal shall be marked with cable markers / ferrules to identify the connections. Cables shall generally conform to IS:9968.

d) Cables for light fittings shall be EPR insulated and HOFR elastomeric CSP sheathed 3 core, 1100 V grade copper conductor cables.

e) Control system shall be supplied with suitable twisted pair cable for communication with the remote controllers in Driller & MP Consoles.
These should be shielded twisted pair, able to withstand the rigors of a drilling rig. Bidder to confirm if the distances as provided in his layout diagram are adequate for STP cables or any signal booster is needed.
Bidder should indicate route of such STP cables, and also take adequate measures to ensure that STP cables used for communication are free from noise due to power cables running in the same cable trays.
All the cables including power, control, lighting etc. shall be supplied complete with suitable male/female plug/ connectors which shall go into proper male/female plug/connectors mounted in the PCR, D'CON, lighting fixtures and motor Terminal boxes.
No soldered terminal socket will be allowed. All terminations shall be properly crimped.

All the cables for power and control, mast lighting, PLC remote racks in D'CON, Brake water cooling system power and control cables and any other cables required for drilling operation shall be suitable for the maximum required distance.

I. E. AUXILIARY EQUIPMENT & SYSTEMS

Auxiliary electrical system shall include the following systems:

I. E. 1. Rig lighting system:

Rig lighting system shall cover the following areas:

Hazardous/ Non-sparking Equipment areas (within a radial distance of 30 m from well-head):

i) Mast, racking board and aviation obstruction lighting
ii) Rig floor/ draw works lighting
iii) Pipe rack and area lighting
iv) Substructure lighting
v) Mud tank lighting
vi) Mud mix/ storage skid lighting
vii) Mud pump lighting
viii) Fuel pump/ tank area lighting
ix) Trip tank pump lighting
x) Choke manifold lighting
xi) Water tank area lighting

Un-classified (general) areas:

xii) Power pack lighting (supplied from lighting transformer)
xiii) Air compressor/ utility house lighting (supplied from lighting transformer)
xiv) BOP unit lighting (supplied from lighting transformer)
xv) General plinth and periphery lighting (supplied from isolation transformer)
xvi) Offices, chemical/ geological lab and crew camp lighting (supplied from isolation transformer)

All lighting load for hazardous areas shall be supplied from 2 nos. 60 KVA, 415 V/ 240 V Phase to Phase transformers, as detailed in the paragraph for PCR lighting transformer [Para I. B. (k) (ii)].
All other lighting load for general area lighting, camps and un-classified areas can be supplied from lighting transformers as well as the isolation transformer [Para I. B. (k) (iii)].
For external source supply (in case the main 415 V bus is not energized), a changeover switch with mechanical interlock will be provided, serving both the 60 KVA transformers through suitable incomer circuit breakers.

All lighting circuits shall have RCBO/ RCD for current leakage sensitivity of 300 mA. Vertical discriminating type RCDs shall be used wherever required.

Heavy duty flameproof and weather proof light fittings (in classified hazardous areas) and normal weather proof light fittings shall be used for illumination.

[Classified Hazardous areas are Zone 1 & 2, for Gas groups IIA & IIB as per Indian/ European standards and Class 1, Division 1 & 2, Gas groups C & D as per North American standards]

Each fitting shall have the following features:

- Weather proof plug and receptacle disconnect to allow safe and easy removal of fitting for service or movement to another location day or night without interruption of any power or

illumination. Disconnects are to be provided at appropriate mast breaks, sub-separation etc. for easy rig up/ rig down of lighting system.

- Suitable for use in hazardous areas supplied with suitable plug socket disconnects
- Shall have safety cables/ chains to secure in mast and substructure
- Complete with thermal and shock resistant glass lens, lamps, ballasts, ignitors, p.f. improvement capacitor, guards, safety chains/ cables etc.

A mast lighting socket board (FLP/Exp type) should be supplied at a convenient place outside the driller's cabin/ dog house to facilitate easy connection/ disconnection for mast/ derrick area lights and dog house air conditioners (if offered).

Aviation obstruction day time white flasher unit (one no.) shall be fixed atop the mast (near crown block) with the following specifications. This unit shall be complete with controller, suitable cable, mounting hardware, photo-electric cell etc.
Day time: 20,000 Cd, flasher type with 40 flashes per minute (White)
Night time: 2,000 Cd, fixed (white)
With automatic change over from day to night

The minimum number and type of light fittings and accessories to be supplied for the rig lighting system are given below-

Sl. No.	Type of Light Fitting	Quantity	Remarks
1	FLP CFL well glass light fitting for 2x20W CFL Lamps, type-Screw cap E-27	90 nos.	Light fittings shall be provided with lamps
2	FLP flood light fittings for HPMV 1 x 250 W lamps	10 nos.	Light fittings shall be provided with lamps
3	Weather proof, 250 W metal Halide light fitting for area lighting	5 nos.	Light fittings shall be provided with lamps
4	Weather proof, 400W HPSV light fitting for area lighting	20 nos.	Light fittings shall be provided with lamps
5	Red aviation LED type warning lamp Double fitting Single fitting	 02 nos. 01 no.	Light fittings shall be provided with lamps
6	Aviation obstruction (daytime aviation warning) lamp	01 no.	With necessary cable, control panel and other accessories
7	Portable small size "T" type light pole for mud tank and mud pump illuminations, 50 mm OD, 4000 mm height- fitted with anti-vibration devices	40 nos.	Indicative diagram of the "T" pole is attached
8	Galvanized and non corrosive swaged type (stepped) steel tubular poles of length 9 m along with double brackets for fixing of HPSV/ HPMV type light fittings	20 nos.	

- All the FLP light fittings shall be DGMS approved.
- For mud tank lighting, suitable mounting/ hanging arrangement with tubular structures (see sl. No. 6 above) for well glass fittings shall be provided on the tanks.
- All the light fittings shall include the necessary control gears needed for smooth operation.

Bidder shall submit a complete and detailed list of light fittings and lighting schematic to be used in the rig.

I. E. 2. Well-site Area & Crew Hut Illumination Control Panel, Skid Mounted

Details:
An oilfield type skid mounted electrical control panel for supplying power to area/ boundary lights and crew houses (camp site) shall be supplied.
The system shall consist of incomers, changeover switch, distribution feeders (MCBs/ switches), plugs and sockets etc., mounted on an oil-field type skid. The complete system will be designed to meet the present load demand as well as the increase in near future. The panel shall be fed from the PCR 415/415 V isolation transformer feeder with a changeover option for running from standby camp/ auxiliary genset.
Construction:

a) The panel shed shall be an outdoor, weatherproof, transportable steel house on a self supporting oil field skid suitable for tail boarding from either end in balanced condition. The shed shall be suitable for either top or bottom lift. There shall be provision for lifting the skid at both ends. **Shed shall be of man height**. Overall dimensions of the shed shall be calculated for working comfortably inside.

The shed shall be a fabricated sheet steel (not less than twelve-gauge) structure and shall house the incomer plug socket compartment, incomer MCCBs (with built-in SC and earth leakage protection), changeover switch, TPN bus and distribution board, outgoing Plugs-sockets, and plug socket compartments. The power to the bus is to be fed from either isolation transformer feeder in Power control room (PCR) or from the auxiliary genset, through a changeover switch.

The side panels containing the incomer and outgoing feeder plug socket arrangement shall swing out for ease of connections / maintenance. Another panel/cover shall be provided outside the socket board panels for protection of the socket board panels during transportation. The outer panel shall be hinged at the top and provided with supports, so that it can also give rain protection to the plug-socket panels, when in operation. All corners of the shed are to be formed by bending, leaving no sheet edge exposed. Skid and panel shall be painted with anti-corrosive paint.

b) Lighting and camp loads shall be equally distributed on the three phases. Each outgoing feeder shall be fed through a suitably rated RCBO, of leakage current setting of 300 mA. There shall be minimum 6 (six) outgoing feeders from each phase. Identical nos. of plugs and sockets (3 Phase, 5 pin) shall be provided in the outgoing plug socket compartment.

- Tinned copper Busbars
- Phase indication lamps
- Voltmeter (on both incomers)
- Internal shed illumination with 1 no. 2x40 W fluorescent indoor industrial corrosion proof luminaire, IP-65, with clear cover, complete with MCB on/off switch mounted outside, wiring (with armoured copper cable, suitably glanded to fitting) at a suitable place
- Internal wiring/cabling- Cables shall be of suitable size, 4 core, copper, screened, FRLS PVC/Elastomer insulated, sheathed and of reputed make
- Plug-sockets (fitted)
- Incomer MCCBs and outgoing RCBO / RCDs
- Changeover switch
- Provision for earthing of the skid

I. E. 3. Cable handling system consisting of Cable trays, cable boxes etc.

No cable will be allowed to be laid on ground outside of a cable tray / cable racks. Sturdy and durable cable trays with non-skid type, hinged, galvanized steel covers shall be provided. Tray covers shall also double up as a convenient walkway.

For mud/water tank cables, foldable type cable hangers should be mounted on mud/ water tank walls, to support the mud system cables. Suggested spacing between hangers is 1000 mm, width of the hangers is 300 mm.

In addition to the cable trays, there should be at least 4 (four) steel cable boxes, skid mounted, for cable storage during rig movement. Cable boxes shall be designed for in-line arrangement.

Design of cable trays/ boxes:

Trays:

Tray frames shall be made of channel section steel of suitable size (preferably 75x40mm cross section structural steel channel beams and 65x65x6mm and 40x40x5mm support channels), designed for carrying heavy cable loads. Lifting lugs shall be provided on the bases. Tray covers shall be of 5 mm thick chequered steel galvanized plate, having loosely fitted lifting handles. Each top cover shall have minimum three no. of hinges for sturdy operation. Each large cable tray shall have 5 hinged top covers. These covers shall be galvanized. Locking arrangement for tray covers shall be provided. Trays shall be designed such that control and power cables run separately on wooden cleats. Sufficient gap shall be maintained from the tray cover to the cable supports. Earthing arrangement shall be provided on the trays.
Indicative dimensional drawing for cable trays is attached.

Cable Boxes:

Cable box frame and skid shall be made of channel (100 x 50mm) and beam (150 x 75mm) of structural steel. Skid shall have lifting arrangement at all the four corners and suitable for balanced lifting. Box structure shall have cross members on the sides to prevent stress and deformation during lifting and transportation. Mild steel sheet, hot rolled, shall be used for sides. Floor of the box shall be constructed of channels with 50 mm gap in between adjacent channels. Additional support shall be provided in the centre with channel/ angle. Ends of the box shall have half doors and will open from a height of 600 mm from ground (hinges to be provided at 600 mm from ground). A round pipe of NB 65 is to be provided at both ends for smooth sliding and pulling out of cables. The end covers shall be designed for locking from inside of the box. End covers shall be designed such that they cannot be opened without opening the top covers.

Five nos. top cover shall be provided, of 5 mm chequered plate (with chequered surface facing up), hinged on one side with sturdy hinges, and free on the other side with locking arrangement. These covers shall be galvanized. Middle cover will be designed such that it cannot be opened without opening the other two top covers. Additional locking bar (removable type) shall be provided on the top to lock all the three top covers with suitable locking arrangement.
Earthing leads shall be provided at both ends of the box.
Indicative dimensional drawing for box is attached.

The galvanization thickness of the cable tray/cable box covers shall be minimum 85 microns to withstand the corrosive environment. The painting of the cable boxes/trays shall be done with Epoxy paint with minimum 180 microns thickness.

Size of cable trays: Mini (with hinged cover) – 1 m (L) X 1 m (W) X 0.5 m (H) – 20 nos.
Intermediate (with hinged cover)-for placing between mini and small/large trays with more height- 1 m (L) X 1 m (W) X (0.5-0.7) m (H) – 02 nos.
Small (with hinged cover) – 1 m (L) X 1 m (W) X 0.8 m (H) – 20 nos.
Large (with hinged cover) – 5 m (L) X 1 m (W) X 0.8 m (H) – 17 nos.
Size of cable box: (with hinged cover) – 4 m (L) X 1 m (W) X 1.2 m (H)

I. E. 4. Rig earthing system

Complete rig earthing system shall be supplied, consisting of G.I. earth electrodes, clamps and suitable size G.I. straps to connect all generators, motors, junction boxes, light fittings, mud tanks, mud pumps, sub structure, water/ fuel tanks, houses, lighting poles and the main PCR (s) to the earth.
Earth electrodes shall be of two sizes, 1200 mm and 2000 mm length, each of 50 mm OD heavy duty steel tube with galvanization. Electrodes shall have holes drilled in the body, MS plates welded on the top for connection of earth straps.
Indicative dimensional drawing for earth electrode is attached.

Frames of all electrical equipment including motors, alternators, junction boxes, light fittings, push button stations, light fitting mounting poles etc. shall be connected to earth using two (2) nos. separate and distinct suitably sized earth conductors as per IE rules (Rule no. 61), which in turn shall be connected to the main earth grid. The whole earthing should be in accordance with IS: 3043.

Earthing of Tanks (including mud tanks, water tanks etc.) –

i) Each mud tank should have two nos. of GI straps 50 X 6 mm mounted on the out side of the walls facing mud pumps and mud mix skid side.
ii) The straps 50 X 6 mm should be welded to the sturdy supports that are welded to the tank wall. The gap between tank wall and strap: 50mm. Spacing between supports: 1000mm. The strap length should be the same as the tank length/ width. Gap between straps should be 150mm.
iii) Straps should be mounted at a convenient height for ease of connection.
iv) The Galvanization thickness of the straps should be minimum 85 microns, to withstand the corrosive environment. 2 nos. each 25 X 3 mm GI strips shall be welded to the main strips and the agitator skids (approx. perpendicular to the main strips 50 X 6mm).
v) Two (2) GI straps of size 50 X 6 mm shall be suitably mounted on each skid to facilitate independent double earthing of the pump motors.

The Earthing scheme along with the electrode layout should be submitted along with the bid.

I. E. 5. Electrician's tools, instruments, special tools, computers for the PLC system

This specification covers the details of Electrician's Tool Kit required for general maintenance & trouble shooting of the Electrical controls for the Rig.

- Set of Standard Maintenance Tools – 1 Lot
- Set of Alignment Tools – 1 Lot
- Air Pressure regulator for engine starting – 1 No.

Technical Details:

Tool kit should comprise of 1 No. / set of following instruments/tools:

1 Digital Multimeter: Model Fluke 177, Make Fluke with meter hanging kit along with other accessories
2 Analog multimeter
3 Digital Clamp meter: Model Fluke/ Megger
4 Digital Insulation Tester (with analog indication): Model BM123, Make AVO/Megger
5 Earth resistance tester , make: Megger, model No DET5/4D – AVO UK
6 Phase rotation meter
7 Combined temperature and humidity meter, make: Fluke
8 Infrared Temperature Meter
9 Sound level (dB) meter
10 Vibration meter, make: Entek IRD

11 Tachometer (Non-contact type)
12 Cable Height Meter
13 Lux meter range- 0-50 lux
14 Soldering Iron 25W, 240VAC, make Soldron, with soldering aid set (Solder wire, soldering flux)
15 Desoldering tool (Vacuum pump type)
16 Screw Driver set
17 Wire tracer
18 Combination Pliers- 2 sizes, 6", 8"
19 Long Nose Pliers
20 Side Cutting Pliers with cable stripper
21 Socket Set (22 sockets + 5 Accessories)
22 Open ended spanner set up to 42 mm
23 Ring ended spanner set up to 42 mm
24 "Mekaster" tool set for foundation bolts of alternators and DC drilling motors
25 Adjustable wrench spanner
26 Chain pulley with frame-01 no.
27 Crimping tool (0.5sqmm – 16sqmm cables)
28 Wire stripper (0.5sqmm – 6sqmm cables)
29 Allen key set 1.5 mm to 10 mm (9 piece set)
30 Portable Hand Drill (up to drill bit size 25 mm)
31 Industrial duty vacuum cleaner in SS body
32 Crimping tool kit for 20 pin plug & sockets – Pyle National USA Make
33 Long handled hand crimping tool
34 Torque wrench
35 Hydraulic Crimping Tool for Generator and DC Motor 300 sq mm cables
36 Dual channel Oscilloscope with programmable screen, battery operated and portable
37 Function generator
38 Laptop computer with latest configuration for control system programming- **bidder to provide details**
39 Desktop computer with latest configuration- **bidder to provide details**
40 Multifunction printer (with fax, copy and scan facilities- suitable for A3/A4 size paper)
41 Software for rig control system with license
42 Secondary injection test kit for Generator/Transformer feeder breakers

CHAPTER II: STANDARDS, STATUTORY RULES AND REGULATIONS TO BE FOLLOWED

a) **Standards**

Though a broad outline on the requirement has been made, yet the scope should include anything not mentioned but required for completeness of the system to meet the requirement of oil well drilling rig (drilling capacity 3200 meters depth using 5" OD Drill pipes) and make the same suitable for dismantling, transportation and installation very often in rough well site conditions.

The system offered should have proven performance record. All relevant safety systems are to be incorporated and safety codes, relevant international codes to be strictly followed.
Systems to be designed & manufactured to the latest version/ editions of the following International and Indian Standards wherever applicable & should meet all present accepted international standards for the product/application

NEC,
IEC,
IEEE-45,
API 500,
NEMA
& I.S. (Indian Standards)

All components, modules, subsystems shall be of current generation with latest technology which must be in production and must not face obsolescence in near future. The supplier and the manufacturer in turn shall guarantee that spare parts shall be available for at least fifteen years.

The controls i.e. all electronics including modules and different electronic components, PLC etc. shall have high levels of noise immunity. They shall have high level of EMC and shall be immune from noise. .

The system including all sub-assemblies and components should be designed to facilitate backward integration of future modules, cards etc without any modification.

b) **Rules and Regulations:**

Notwithstanding the conformity of the electrical equipment to the standards as mentioned above in Para (a), the following Rules shall be taken as final and absolute standard as applicable in India.

Indian Electricity Rules, 1956 with amendments
Oil Mines Regulations, 1984 with latest amendments

1. The electrical equipment to be used in hazardous areas of oil mines as classified by DGMS (India) [**Extract of the Directive from DGMS given as *Annexure-DGMS*** shall be approved by DGMS (India) for Zone-1 and Zone-2, Gas groups IIA and IIB of oil mines.

   The DGMS (India)'s approval for all electrical equipment to be used in the hazardous areas shall be submitted with technical bid.

2. All electrical equipment not suitable for hazardous area, e.g., Power Control Rooms (PCR), Power Packs etc. shall be placed at least 30 metres away from well head. Bidder to furnish rig layout drawing indicating dimensions (as per OMR, 1984).

   Note: Since all non-sparking equipment (PCR etc.) are placed at least 30 m away from well-head, all cable lengths should be appropriately sized by bidder while quoting.

CHAPTER III: SPARES

Bidder shall submit complete list of the spares for the electrical items of the rig **with prices** as follows. ***These will be evaluated for bid comparison.***

- Minimum **mandatory** spares required for maintenance should be as per the following list. However, if for any individual item, the manufacturer recommends a higher quantity, then the higher quantity should be quoted. Manufacturer should confirm that the quoted items meet the needs for spares for 4 to 5 years.

- **Commissioning spares**: It is the responsibility of the supplier to provide adequate commissioning spares and consumables required during commissioning- these shall be handed over to OIL if unused.

List of Mandatory Spares

Sl. No.	Spare item	Used in	Qty.
1	Rotating rectifier assembly of each type	Alternator of power pack and standby gensets	1 unit
2	Exciter unit of each type	Alternator of power pack and standby gensets	1 unit
3	Diodes of rotating rectifier (3 fwd. + 3 rvs.) of each type	Alternator of power pack and standby gensets	1 set
4	Movistor of each type	Alternator of power pack and standby gensets	3 nos.
5	Blower unit (for drilling motor) complete with drive motor	DC drive motors	1 unit
6	Carbon brushes	DC drive motors	100 nos.
7	Control fuses of each type	PCR	02 sets
8	Fuse holder set (base and carrier) of each type	PCR	02 no.
9	Control switches of each type	PCR, D'con	01 no.
10	Indicating meters of each type	PCR, D'con	01 no.
11	Control pots of each type	PCR, D'con	01 no.
12	Control relays of each type	PCR, D'con	02 nos.
13	Contactors of each type	PCR, D'con	02 nos.
14	Power fuse for thyristor/ SCRs	PCR thyristor panels	12 nos.
15	Thyristor devices	PCR thyristor panels	12 nos.
16	Control module for air circuit breaker of each type	PCR generator/ thyristor/ transformer panels	01 no.
17	Air circuit breaker/MCCB of each type	PCR generator/ thyristor/ transformer panels	01 no.
18	PCB of each type	PCR generator/ thyristor/D'con/ field panels	01 no.
19	Control/ regulating transformer of	PCR generator/ thyristor/ field	01 no.

	each type	panels	
20	DC motor field supply assembly	PCR field panels	01 no.
21	MCCB for AC motor starters of each type	PCR starter/ feeder panels	01 no.
22	Contactors for AC motors of each type	PCR starter/ feeder panels	01 no.
23	Overload relays of each type	PCR starter/ feeder panels	02 nos.
24	RCD of each type	PCR starter/ feeder panels	02 nos.
25	Soft starter of each type	PCR starter/ feeder panels	01 no.
26	Indication lamps of each type and colour	PCR, D'con	3 sets
27	Light fittings of each type	Area illumination	01 no.
28	Bulbs/ tubes of each type	Area illumination	20 nos.
29	Plug and socket set of each type	PCR, D'con	06 nos.
30	PBS unit	AC motors	02 nos.
31	Complete alternator unit (with exciter)	Power packs	01 no.
32	MP DC motor with complete blower unit	DC drives	01 no.
33	Solid control system motors, of each type/ size	Solid control system	01 no.
34	Emergency lamp		01 no.

CHAPTER IV : APPROVAL OF DRAWINGS, STAGE INSPECTION AND PERFORMANCE TESTING AT WORKS

Following minimum drawings, documents and details of electrical equipment shall be submitted by the party for approval:

Schedule for submission of drawings and documents are attached in the Annexure- Schedule of Submission of Drawings and Documents

i) Rig layout drawing, showing relative distances of all equipment
ii) Interconnect drawings (power, network, signal)
iii) PCR dimensions
iv) Rig earthing layout
v) Single line power flow diagram of the rig
vi) Cable specifications/ details
vii) Details of all electrical equipment used in the rig, including alternators, motors, cables, light fittings, push button stations, plug & sockets, junction boxes, starters etc. used in the rig

In case of the successful bidder, OIL shall study the drawings and incorporate modifications/ corrections if required. The bidder shall incorporate the modifications in the drawings and submit the same to OIL for approval. Only after getting due approval of drawings from OIL, the bidder/ manufacturer shall proceed for manufacturing/ integration of the electrical system.

Bidder/ supplier shall submit the following along with the supply of materials:

- Twenty (20) sets of drawings as above - in hard copy & Ten (10) sets of drawings as above - in CD-ROM
- "As built" drawings (Corrected and final drawings after commissioning)
- "As built" Bill of Materials (BOM)- Final after commissioning

Bidder shall agree to stage wise inspection of the following electrical equipment by OIL personnel, under various stages of manufacture, before dispatch. Bidder shall give inspection calls sufficiently in advance.

- PCR
- Powerpacks
- Drilling motors

Performance testing of equipment: Bidder shall also agree to witness testing of performance of the complete rig package including performance of all electrical system at their works by OIL personnel.

Inspection of Equipment by Oil India Limited (OIL):

Bidder shall agree to stage-wise inspection as per following schedule, of the major electrical equipment, as well as the complete rig package by OIL personnel, at various stages of manufacture, before dispatch.

The Inspection cum Acceptance process would include the following minimum steps/tasks, (valid for that stage of manufacture / integration) -

1. Physical verification/inspection of all the items/fittings/accessories including all Parts Catalogue, Maintenance & Service Manuals, Schematics.
2. Operational / functionality testing of each & every system under load (if applicable) / no load. Performance parameters shall match quoted specifications.
3. Supplier shall have to take note of any modification/s for operational requirement suggested by the inspection team and comply with the same at no extra cost.
4. The minutes of inspection process would be prepared at the end of each inspection and jointly signed by both the parties.

5. Supplier shall confirm in writing compliance of all the points raised in the minutes of inspection as well as any other subsequent additions/changes, felt necessary.

6. Supplier will affect dispatch of the unit only on receipt of OIL's dispatch advice.

	Intermediate Assembly of individual equipment, after FAT, at manufacturer's works	Complete Assembly of individual equipment, after FAT, at manufacturer's works	Complete, integrated rig package, at suitable location, before dispatch for string and load test
PCR	√	√	√
Power Packs	-	√	√
Auxiliary systems- Lighting, earthing, cables crew cabin, etc.	-	-	√
Complete Rig Package	-	-	√

FAT – Field Acceptance tests / Manufacturers standard acceptance procedures, valid for that stage of manufacture.

Inspection of individual equipment – equipment include the PCRs, Power Packs etc.

ANNEXURE TO SECTION -9

CHAPTER V: ELECTRICAL ANNEXURES

V.A ELECTRICAL ANNEXURE – Statutory

1. DGMS Circular for Demarcation of Hazardous Areas

Drilling and Work-over Operations :

(1) Well-head area :

(a) When the derrick is not enclosed and the substructure is open to ventilation, the area in all directions from the base of rotary table extending up to 3.0 m shall be Zone 2 hazardous area. Any cellars, trenches and pits below the ground level shall be Zone 1 hazardous area; the area lying up to 3.0 m in horizontal direction from the edge of any cellars, trenches or pits and 0.5 m vertically above the cellars, trenches or pits shall be Zone 2 hazardous area.

(b) When the derrick floor and substructure are enclosed, the enclosed substructure below the derrick floor, including cellars, pits or sumps below the ground level, shall be Zone 1 hazardous area; the enclosed area above the derrick floor shall be Zone 2 hazardous area.

(2) Mud Tank and Channel :

The free space above the level of mud in tank and channel shall be Zone 1 hazardous area; the area in a radius of 3.0 m in all directions from the edge of mud tank and channel shall be Zone 2 hazardous area.

(3) Shale Shaker:

(a) The area within a radius of 1.5 m in all directions from the shale shaker to open air shall be Zone 1 hazardous area. The area beyond 1.5 m and up to 3 m in all directions from the shale shaker shall be Zone 2 hazardous area.

(b) When the shale shaker is located in an enclosure, the enclosed area shall be Zone 1 hazardous area to the extent of the enclosure. The area outside the shale shaker and up to 1.5 m in all directions from the shale shaker shall be Zone 2 hazardous area.

(4) Degasser :

The area within a radius of 1.5 m from the open end of the vent extending in all directions shall be Zone 1; the area beyond 1.5 m and up to 3 m in all directions from the open end of vent shall be Zone 2 hazardous area.

(5) Desander and Desilter :

The area within a radius of 1.5 m in all directions from the desander and desilter located in open air shall be Zone 2 hazardous area.

(5) Pump or Gas Compressors :

(a) Where a pump handling a flammable liquid or a gas compressor is located in open air or under well ventilated shed without walls, the area lying up to 3m in all directions from the pump or compressor shall be Zone 2 hazardous area

(b) Where a pump or compressor is located in an adequately ventilated building, the entire interior of such building including an area within 1.5 m of the vent shall be Zone 2 hazardous area.

(c) Pits, sumps, trenches below the ground level shall be Zone 1 hazardous area and the area lying up to 3.0 m in horizontal direction from the edge of any trench or pit and 0.5 m vertically above the pits, sumps or trenches shall be Zone 2 hazardous area.

(6) Storage Tanks :

(a) In case of floating roof tank, the space above the floating roof and inside the enclosure up to top level of the enclosure wall shall be Zone 1 hazardous area; the area beyond Zone 1 hazardous area and up to a radius of 4.5 m in all directions from tank shell and shell top shall be Zone 2 hazardous area. In case of a dyke, Zone 2 hazardous area shall extend vertically up to the height of the dyke and horizontally up to the physical boundary of the dyke.

(b) In case of fixed roof tank, the area inside the tank and within a radius of 1.5 m from all openings including breather valve, dip hatch, thief latch and safety valve shall be Zone 1 hazardous area; the area beyond Zone 1 hazardous area and up to a radius of 3 m in all directions from shell and roof of the tank shall be Zone 2 hazardous area. In case of a dyke, the sump in the dyke shall be Zone 1 hazardous area and an area extending vertically up to a height of the dyke and horizontally up to the physical boundary of the dyke shall be Zone 2 hazardous area.

2. **Use of flexible cables in drilling rigs and in other similar equipments in Oil Mines.**

1.0 Flexible cables are in use with drilling rigs and in other similar equipments in oil mines.

2.0 The electrical equipment used in a drilling rig are high capacity DC motors, 3 phase AC motors, their control gears, light fittings and instrumentations.

3.0 Flexible cables used with circuits exceeding low voltage shall be provided with flexible metallic screening or pliable armouring.

4.0 Such flexible metallic screening if used as a means of protection from mechanical Injury it shall not be used by itself to form an earth conductor, but it may be used for that purpose in conjunction with an earthing core.

5.0 Though the metallic screening shall not be used by itself to form an earth conductor the same shall have conductivity at all parts and at all joints at least equal to 50 per cent of the conductivity of the largest conductor.

6.0 IS: 14494-1998 "Elastomer insulated flexible cables for use in mines-specification" and IS: 9968 Part I & II, “Specifications for elastomer insulated cables” are the relevant Indian Standards available on elastomer insulated cables.

7.0 IS: 14494-1998 is mainly for flexible cables used in below ground and open cast mines. This standard does not cover flexible cables used in oil mines. Though IS:9968(Part-I) does not speak about metallic screening for cables at voltages above low voltages, however, to afford

protection against mechanical injury, it is imperative that flexible cables for use in oil mines must have metallic screening also.

8.0 Hence it becomes mandatory that

(a) The flexible cables used to connect 3 phase electrical equipments shall be EPR (Ethylene Propylene Rubber [IE-2]) insulated and HOFR (heat resisting, oil resisting & flame retardant) Elastomeric CSP (Chloro-Sulphonated Polyethylene) sheathed, either individually or collectively copper screened, 4 core copper conductor cables with fourth core having 50% conductivity of the largest conductor and the combined screen having 50% conductivity of the largest conductor.

(b) The flexible cables used to connect light fittings shall be EPR insulated and HOFR elastomeric CSP sheathed unscreened 3 core copper conductor cables.

(c) The flexible cables used with alternators and DC motors shall be single core EVA (Ethyl Vinyl Acetate rubber) insulated and sheathed, copper conductor cables, and,

(d) The flexible cables used for control connections shall be EPR insulated, and HOFR elastomeric CSP sheathed, copper screened flexible copper conductor cables having cores up to 20 and shall generally conform to IS:9968 (Part-1).

9.0 Termination of flexible cables with electrical equipments installed in hazardous area shall be through appropriate size of double compression glands and with electrical equipments installed in non-hazardous areas shall be through a readily detachable plug and socket assembly.

V.B ELECTRICAL ANNEXURE-STANDARDS

STANDARDS TO BE FOLLOWED BY DIESEL ELECTRICAL AC-SCR RIGS IN OIL'S MINING AREAS

Sl. No.	Item	Statutory Rules/ Guidelines/ Directives	OIL's Remarks	Remarks by Bidder
1	Distance of PCR and power packs (engine + alternator) from well shall be 32.0 m	OMR-1984 (Amended 1996) specifies 30.0 m	OIL's practice is 32.0 m [As per I. S. Code 5572 (1994)]	
2	All electrical equipment including motors, starters, push button stations, lighting fixtures, plugs and sockets, glands/ connectors, junction boxes and accessories etc. used in hazardous/ dangerous areas of oil mines shall be either flameproof/ explosion proof (Ex-d) or increased safety type (Ex-e) and must have approval from DGMS (India) for use in Zone 1 and Zone 2, gas groups IIA and IIB of Oil Mines.	DGMS Directive and OMR Rules 73, 75	It is a statutory requirement and must be complied with.	

3	Every power feeder, motor and lighting feeder shall be provided with an Earth Leakage Circuit Breaker/ Residual Current Device [above 5 KW and medium voltage(≥ 250 V)]	Indian Electricity Rules, 1956 (Amended 2002): Rule 61 A	ELCB will disconnect the supply instantly at the occurrence of earth fault or leakage current.	
4	600 V ungrounded generator system with AC/DC GFD system shall have audio-visual annunciation.		Audio annunciation is generally NOT AVAILABLE	
5	Power supply to lighting circuits in Hazardous areas shall be phase-to-phase 240 VAC, 50 Hz	Indian Electricity Rules: Rule 131		

Sl. No.	Item	Statutory Rules/ Guidelines/ Directives	OIL's Remarks	Remarks by Party
6	Aviation warning lamp: **Day lamp**: 20,000 Cd, flasher type with 40 flashes per minute (WHITE) **Night lamp**: 40 Cd, fixed (RED) *[5 nos. of flashers are indicated, one at crown and four nos. at thribble board, colour unspecified]*	Ministry of Defence, (Govt. of India) directive	The lights shall be operational at all times from the moment the mast is raised until the mast is finally lowered irrespective of well operation.	
	Minimum Illumination Level to be maintained: Pump-house shed- 100 Lux Derrick floor- 80 Lux Pipe rack area- 60 Lux Monkey Board- 30 Lux Compressor shed-100 Lux Sub-structure- 150 Lux Engine room- 80 Lux Peripheral/ General area- 10 Lux	As per Oil India Practice		
7	Pressurized type D'CON/ foot throttle shall be used; alarm will be provided for loss of purging.	This is required as an additional safety feature; but these items are outside DGMS classified hazardous areas. Purging required as per OMR spec. 67.		
8	Emergency shut off device (ESD) system- at Driller's control panel			

Preferred Make of instruments / equipment / auxiliaries:

Sl. No.	Equipment / instrument / auxiliaries	Preferred make / model
1	Alternator	Kato/ Caterpillar /Baylor/ BHEL
2	DC Drilling motor	GE/BHEL
3	SCR panels	NOV/ Ross Hill
4	Air Circuit Breaker	Merlin Gerin (Group Schneider)/ ABB / GE / Siemens
5	MCCB	Group Schneider / Siemens
6	MCC panel components	GE /Siemens /ABB /Allen-Bradley /Group Schneider
7	Soft starters	ABB/Siemens
8	Plug Sockets	Amphenol (Pyle National) /Connectwell /Cutler Hammer

V.C ELECTRICAL ANNEXURE- MCC STARTERS/ FEEDERS

SL. NO.	STARTER PANEL	MOTOR / LOAD (HP)	QUANTITY	PANEL CAPACITY (HP)
1	LINER FLUSHER, MUD PUMPS	3	2	5
2	MAIN LUBE, MUD PUMPS	1	2	5
3	CHAIN OILER, MUD PUMPS	1	2	5
4	SUPER CHARGERS	75	2	100
5	BLOWER MOTORS	7.5	2	10
6	WATER BOOSTERS	30	2	40
7	BRAKE WATER COOLING	60	2	100
8	DISC BRAKE C/WATER PUMP	60	2	100
9	AIR COMPRESSOR	40	2	50
10	AFTER COOLER	1	2	5
11	PCR AIR CONDITIONER	50	1	100
12	MUD AGITATOR	10	18	10
13	WATER AGITATOR	10	4	10
14	PILL CHAMBER	10	1	10
15	DESANDER	75	1	100
16	DESILTER	75	1	100
17	MUD MIXERS	75	2	100
18	MULTI-STAGE PUMPS	100	2	100
19	PIT PUMP	75	1	100
20	SOURCE WATER WELL	5	2	5
21	SHALE SHAKERS	5	3	5
22	DEGASSER	5	1	5
23	CELLAR	5	1	5
24	FUEL PUMPS	5	2	5
25	BUG BLOWER	5	1	5
26	TRIP TANK	15	2	20
27	RECYCLING PUMP	5	2	10
27	IR FILTER, WATER	1	1	5
28	MUD CLEANER	5	2	5
29	HIGH PRESSURE JET CLEANER	1	1	5
30	POWER TONG	60/70	1	100
31	PCR AIR CONDITIONER	40	1	40
32	BOP FEEDER	40	1	40
33	FEEDER FOR LIGHTING TRANSFORMERS	60	2	100
34	RIG LIGHTING D.B.	-	-	-
35	WELDING MACHINE	50	1	50
36	3 WIRE 240 V Ph-Ph FEEDER	-	2	5
37	2 WIRE 240 V Ph-Ph FEEDER	-	3	1

38	HAND LAMP	1	2	5
39	110 V SUPPLY FEEDER	1	1	5
40	AIR DRIER	1	1	5
41	INST. MANAGER'S CABIN	10	1	20
42	MOBILE AIR COMPRESSOR, FOR CEMENTING	40	1	50
43	TORQUE WRENCH, BOP	2	1	5
44	EASY TORQUE	5	1	5
45	MUD VOLUME TOTALIZER	1 KVA	1	5
46	BOP TROLLEY	20	1	20
47	SPARE FEEDER	-	2	100
48	SPARE FEEDER	-	2	40
49	SPARE FEEDER	-	2	10
50	SPARE STARTER	-	1	100
51	SPARE STARTER	-	1	40
52	SPARE STARTER	-	1	10

V.D ELECTRICAL ANNEXURE- SCHEDULE OF SUBMISSION OF DRAWINGS/ DOCUMENTS

Sl. No.	Details of drawing / document	Submission schedule		
		With the bid	Before Mobilisation/ Inspection	After commission-ing
1	Indicative single line power flow diagram of the rig, showing all voltage levels	√		
2	Indicative Rig Layout diagram (Plan), showing relative distances of all electrical equipment	√		
3	Indicative PCR dimensional drawings, including details of rain protection for transformers, cable & plug sockets etc.	√		
4	Layout of the complete earthing system including earthing of PCR, AC & DC motors, alternators, diesel tanks & any other electrical equipment used for the purpose	√		
5	Third party inspection report/ equipment literature	√		
6	DGMS approval for all electrical equipment within classified areas	√		
7	Mandatory spare parts/ Spare equipment / Consumables list	√		
8	Rig lighting schematic with light fittings used	√		
9	***Annexure-Datasheet*** with all relevant documents	√		
10	"As-built" drawings, operation and workshop manuals and any other relevant documents			√

V.E ELECTRICAL ANNEXURE- DATASHEET

CHAPTER	Information requested from bidder	Bidder's reply	Remarks
Statutory			
Chapter II, Para (b) (1)	All electrical equipment to be used in classified Hazardous areas to be DGMS (India) approved. Bidder will arrange for approval from DGMS. Bidder to forward the DGMS (India)'s approval for all electrical equipment to be used in the hazardous areas along with the technical bid.		
	Restricted neutral earth system shall have a maximum earth fault current of 750 milliAmps using NGR. Bidder to confirm.		
	Earth fault system to have both audio and visual alarms. Bidder to confirm.		
General			
	Complete electricals of the rig offered (as per Chapter I, Clause vii)? Any deviation/ non-submission in this regard shall be given in a separate sheet.		

	Generation system voltage: 600 VAC- Offered?		
	PLC based rig control system- offered?		
	Emergency Stop controllers on D'con- Offered?		
	Entire Electrical AC system frequency shall be 50 Hz.		
	Main DC drives shall be assignable to different SCR panels/ dedicated. Bidder to confirm.		
	"Mandatory Spares" offered?		
	Vintage/ year of manufacture of equipment- New/ Unused / recent manufactured- Bidder to indicate.		
415 VAC system			
	Spare MCC cubicles (at least one from each size) available?		
	Each individual panel in the 415 VAC MCC provided with RCD / ELCB for power circuit as well as control circuit. Bidder to confirm		
	Control voltage (e.g. 110 VAC or lower) employed in motor control circuits		
	Permanent Insulation monitor provided in the NGR system?		
	Bidder to indicate Standards followed for selection of MCCB, contactors and relays for motor starting / power feeders at AC MCC (415VAC)		
Power packs			
Chapter I A	No. of power packs offered		
	Make of alternator offered		
	Alternator rating (kVA)		
	Alternator temp. rise above ambient (degree C)		
	Speed (RPM)		
	Bidder to indicate standards followed in design and construction of alternator.		
	Datasheet of the offered alternator- Bidder to submit		
	Are the alternators suitable for SCR controlled DC drive?		
	HOC circuit offered?		
	Reports of standard commercial tests performed on the offered alternators (in accordance with IEEE Std. 115, NEMA MG-1, or MIL-Std. 705 standards) attached		
	Type of engine control system offered- AC module (Hill Graham/ Ross Hill type)/ engine & alternator control separate/ any other type- Bidder to specify.		
PLC system			
Chapter I B, (a)	Manual bypass mode provided for PLC?		
	PLC Control system is field proven and running		

	for a minimum period of 3 years? Credentials for this to be submitted with bid.		
Power Control Room			
Chapter I B	Dimensions (as given in Specifications) to be adhered to- Bidder to confirm.		
	Weight (as given in Specifications) to be adhered to- Bidder to confirm.		
	PCR suitable for bottom lifting- Bidder to confirm		
	PCR oil field type Skid mounted- Bidder to confirm		
	PCR suitable for heavy rain areas		
	Plug socket cable terminations are of crimped type- Bidder to confirm		
Generator panels			
Chapter I B, (b)	No. of panels to be offered- minimum 3 nos.- Bidder to confirm		
SCR panels			
Chapter I B, (c)	No. of panels to be offered- minimum 3 nos.- Bidder to confirm		
	Amps rating of SCR panel bridge (minimum 2000 A) - Bidder to indicate		
Air conditioning			
Chapter I B, (i)	Cooling Capacity (tons) – Bidder to provide tonnage requirement for PCR and details of the air conditioning system.		
	Type (Split / window/ package)		
	Full redundancy (100%) provided for air conditioning?		
	Mounting of Air conditioners on the same skid as PCR – Bidder to confirm		
	Make of AC offered		
	Model of AC offered		
D'Con			
Chapter I B, (j)	Bidder to furnish details of D'CON		
Transformer (main- PCR)			
Chapter I B (k) (i)	Capacity offered – Minimum 1 x 1000 KVA		
	Voltage ratio		
	Transformer temperature rise above ambient (C)		
	Transformer suitable for parallel operation (Yes/No)		
	Transformer insulation class		
	Transformer impedance (%)		
	Transformer Enclosure type (IP 23 etc) if offered		
	Transformer terminations – primary and secondary (Stand off / cable connected in air filled enclosure)		
	Transformer Make		
	Transformer model		
	Provision for Star connected secondary with		

	neutral terminal available in terminal box		
Transformer (Lighting)			
Chapter I B, (k) (ii)	Capacity offered – Minimum 2 x 60 KVA		
	Voltage ratio		
	Transformer temperature rise above ambient (C)		
	Transformers suitable for parallel operation (Yes/No)		
	Transformer insulation class		
	Transformer impedance (%)		
	Transformer Enclosure type (IP 23 etc) if offered		
	Transformer terminations – primary and secondary (Stand off / cable connected in air filled enclosure)		
	Transformer Make		
	Transformer model		
	Provision for Star connected secondary with neutral terminal available in terminal box		
Transformer (Isolation)			
Chapter I B, (k) (iii)	Capacity offered – Minimum 1 x 100 KVA		
	Voltage ratio		
	Transformer temperature rise above ambient (C)		
	Transformers suitable for parallel operation (Yes/No)		
	Transformer insulation class		
	Transformer impedance (%)		
	Transformer Enclosure type (IP 23 etc) if offered		
	Transformer terminations – primary and secondary (Stand off / cable connected in air filled enclosure)		
	Transformer Make		
	Transformer model		
	Provision for Star connected secondary with neutral terminal available in terminal box		
MCC-PCR			
Chapter I B, 1 (l)	The starters as given in “Annexure-MCC Starters/Feeders” are to be incorporated in the MCC panel of PCR. Bidder to indicate deviations and additions if any.		
	The MCCBs, contactors and relays for the starter panels shall be as per Type 2 coordination (IS 13947 or IEC60947). Bidder to confirm.		
Socket Board- PCR			
Chapter I B, (m)	Type and make of plug-socket. Bidder to indicate.		
Drive Motors			
Chapter I C 1- Mud pump motors	Separately excited shunt motor offered?		
	Capacity- HP/KW		

	Voltage		
	Speed (RPM) at full HP output		
	Max. Current (FLC, in Amps)		
	ambient temperature (C)		
	Torque (lb-ft)		
	Make		
	Model		
Chapter I C 2- AC auxiliary motors	The motors as given in “Annexure-PCR Starters/Feeders” are to be supplied. Bidder to indicate deviations and additions if any.		
	DGMS approval for electrical equipment (motors) to be used in hazardous areas to be obtained and submitted as per Annexure- Schedule for Submission of Documents. Bidder to confirm.		
	Motors shall be fitted with FLP/Exp double compression cable glands- Bidder to confirm		
Cables			
Chapter I D	Cable lengths shall be suitable for maximum required distance. Bidder to confirm.		
Refer Annexure-DGMS for Cables.	Type of cable for 3 phase equipment- HOFR, EPR insulated, CSP sheathed and copper screened 4 core copper conductor. Bidder to confirm.		
	Type of cable for light fittings- HOFR, EPR insulated, CSP sheathed and copper 3 core copper conductor. Bidder to confirm.		
	Type of cable for alternators & DC Motors- single core EVA insulated and sheathed copper conductor. Bidder to confirm.		
	Type of cable for control connections- HOFR, EPR insulated, CSP sheathed and copper screened copper conductor having cores up to 20. Bidder to confirm.		
	All the cables including power, control, lighting etc. shall be supplied complete with suitable male/female plug/ connectors. Bidder to confirm.		
	Cores shall be identifiable by colour/ number.		
Rig lighting system			
Chapter I E, 1	All the FLP light fittings shall be DGMS approved. Bidder to confirm.		
	All the light fittings shall be provided with necessary control gears and lamps. Bidder to confirm.		
	Mast lighting socket board offered?		
	Lighting voltage (e.g. 240 volt phase to phase for hazardous areas/ 240 volt phase to neutral for other areas)		
	Aviation warning lights offered – Red colour, continuous glow(night), white colour – flashing(day)		

	Lighting scheme and details of submitted?		
Area lighting panel			
Chapter I E, 2	Offered as per specifications- Bidder to confirm		
Cable handling system			
Chapter I E, 3	Trays, boxes as per specifications- Offered?		
Rig earthing system			
Chapter I E, 4	The Earthing scheme along with the electrode layout shall be submitted as per “Annexure-Datasheet”.		
Tools and Tackles			
Chapter I E, 5	The list of tools and tackles as given in the specifications are to be supplied. Bidder to indicate deviations and additions if any.		
Spares			
Chapter III	“Mandatory spares” as given in the specifications are to be supplied. Bidder to indicate deviations and additions if any.		
Drawings and Documents to be submitted with the bid			
	Schedule for submission of drawings and documents are attached in the Annexure-Schedule of Submission of Drawings and Documents		
	i) Rig layout drawing, showing relative distances of all equipment ii) Interconnect drawings (power, network, signal) iii) PCR dimensions iv) Rig earthing layout v) Single line power flow diagram of the rig vi) Cable specifications/ details vii) Lighting scheme and details viii) List and details of all electrical equipment use the rig, including alternators, motors, cables, fittings, push button stations, plug & sockets, junction boxes, starters etc. used in the rig		

Checked and Confirmed

_____

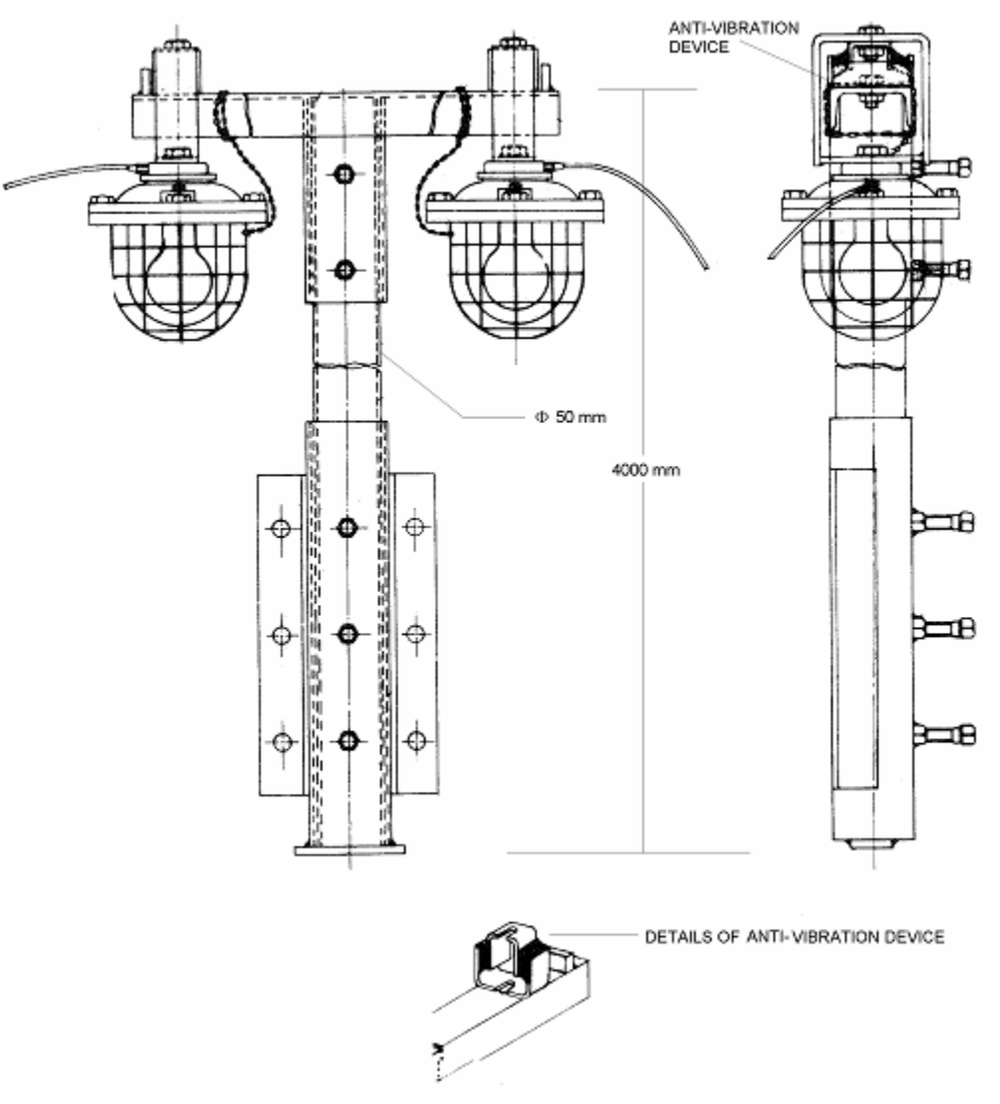
(Signature)

Seal

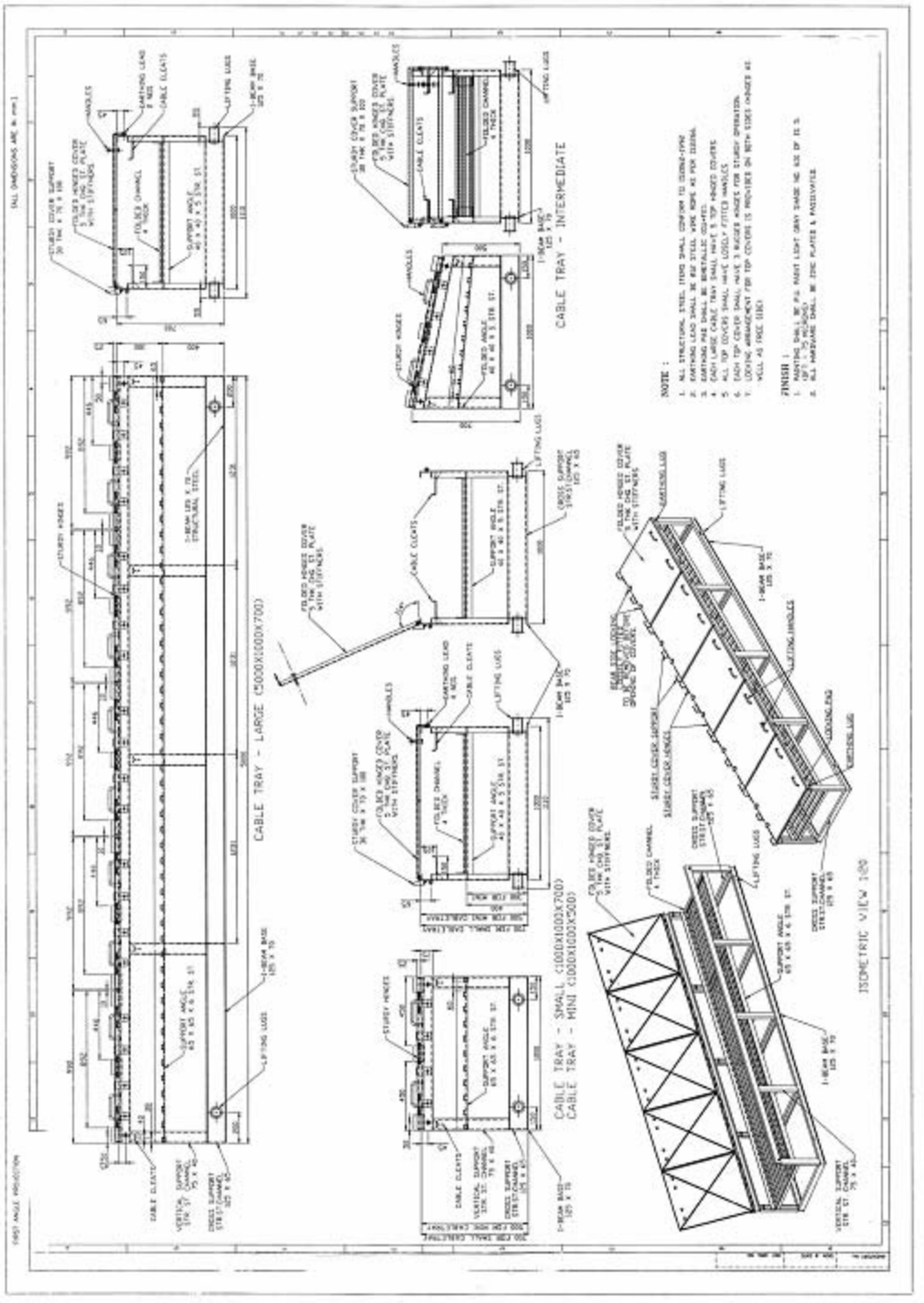
V.F ELECTRICAL ANNEXURE- INDICATIVE DRAWINGS

1. Indicative diagram of ‘T’ –pole
2. Indicative diagram of cable trays
3. Indicative diagram of cable box
4. Indicative diagram of earth electrode

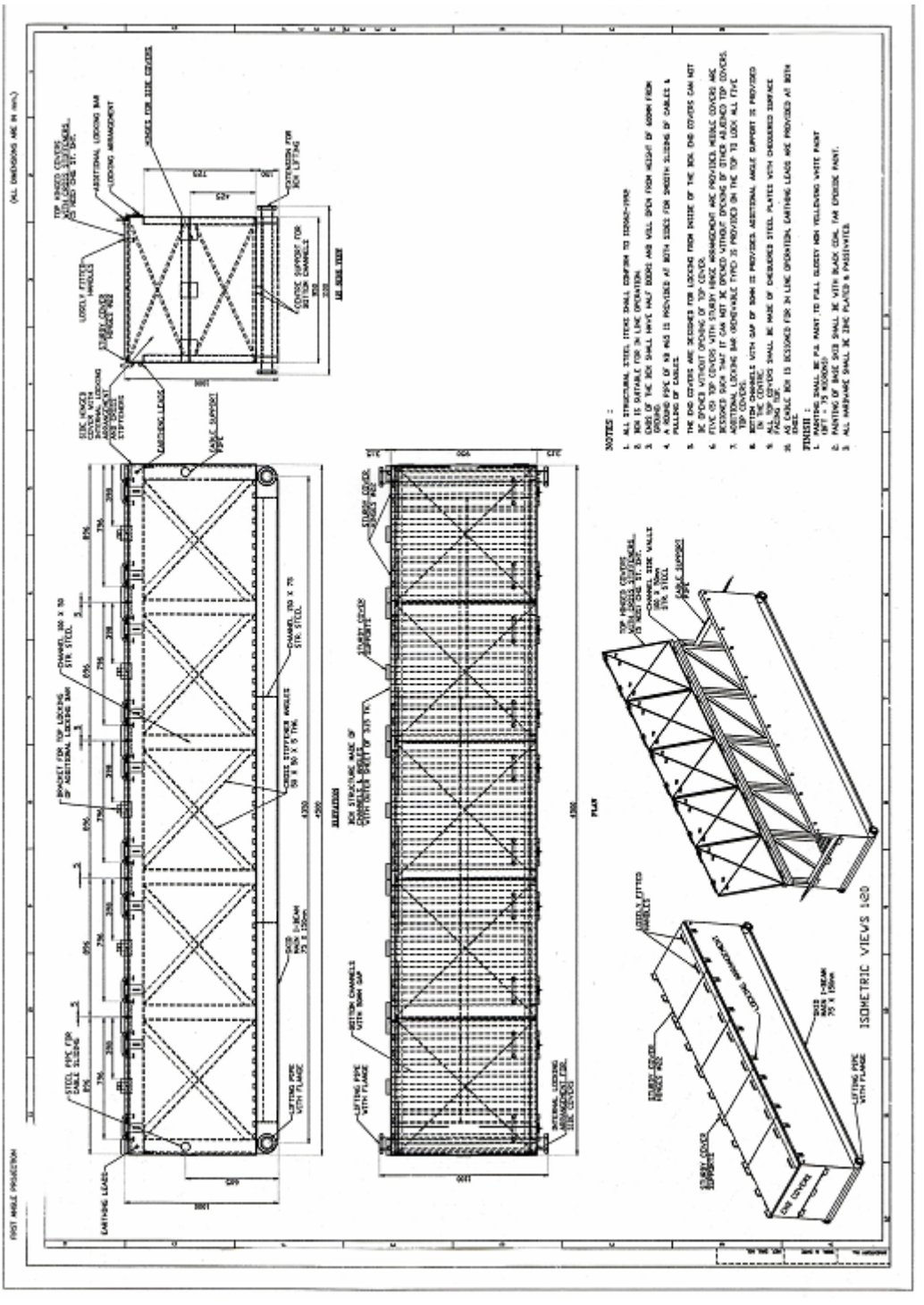
INDICATIVE DIAGRAM: “T”- POLE



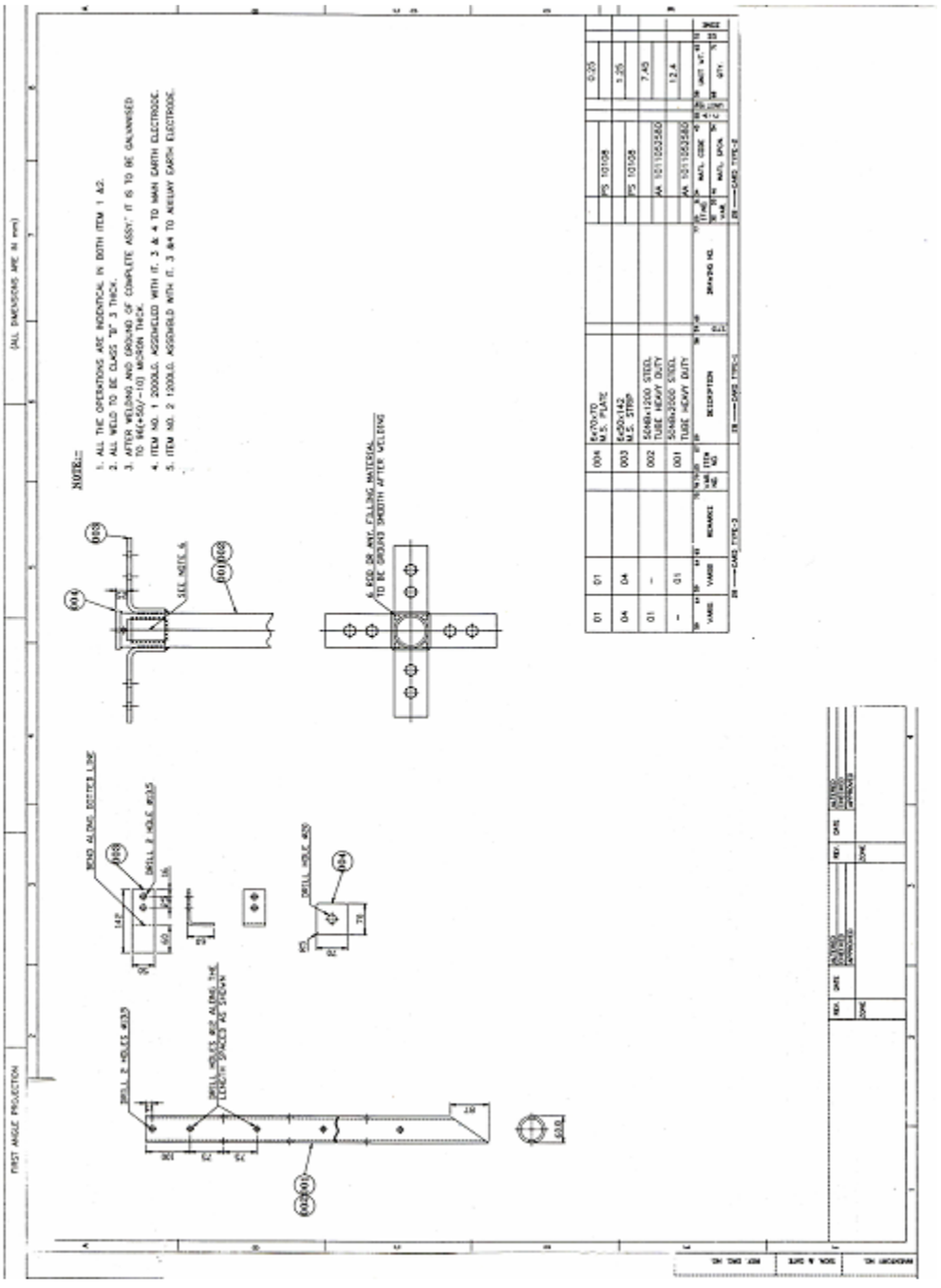
INDICATIVE DIAGRAM- CABLE TRAYS



INDICATIVE DIAGRAM- CABLE BOX



INDICATIVE DIAGRAM- EARTH ELECTRODE



V.G ELECTRICAL ANNEXURE- COMMISSIONING SCHEDULE OF ELECTRICAL EQUIPMENT

COMMISSIONING STAGES

Installation, wiring and laying out of equipment: On arrival of equipment and materials (commissioning spares etc.) at OIL's premises the supplier should carry out inspection of the supplied items to ascertain and certify that there is no transit damage and items are complete in all respect and ready for installation. In case of any discrepancy, supplier shall take necessary action for immediate replacement/ replenishment of the same before installation.
After receipt, the equipment shall be installed at site. This will include wiring/ cabling, fitting of plugs and sockets and any other activity required to make the equipment ready for commissioning.

Initial commissioning after start up connection: This activity will cover insulation checks, wiring checks, phasing up (powering up) of individual equipment and the system as a whole. After start up connection and powering up, the complete system shall be tested at no load and minimum/ low load at OIL's well site. Any modification/ re-wiring/ repair shall be carried out at this stage.

Final commissioning:
Any problems, abnormalities, anomalies and defects noticed/ logged during the completion of the well (operation at full/rated load) shall be rectified by the supplier. This will cover setting/ adjustment/ calibration of limits in the control system, drives etc.

Sl. No.	**Equipment**	**Commissioning schedule**		
		Installation, wiring and laying out of equipment	Initial commissioning after start up connection	Final commissioning
1	PCR	Pre-wired	√	√
2	Cables (termination with proper lugs/ sockets)	√		
3	Main drives (drilling motors): Connection, preliminary checks and power up	√	√	√
4	Auxiliary drives (AC motors): Connection, preliminary checks and power up	√	√	√
5	Rig lighting system: Connection, preliminary checks and power up	√	√	√
6	Rig earthing system: Connection, measurement of earth resistance	√		

Supplier's commissioning engineer and personnel shall be available at all the three stage of commissioning as explained above during the complete period.

Any equipment that fails during commissioning at any stage shall be REPLACED at suppliers cost.

Supplier shall ensure adequate commissioning spares/ consumables are dispatched.

SECTION 10: MISCELLANEOUS ITEMS / EQUIPMENT

1. DOG HOUSE:

One (1) doghouse with wall mounted air conditioner, approximately 10 ft long x 5 ft wide having a sliding door with tempered glass window and additional window near the knowledge box & tool board.

2. AIR COMPRESSOR & RECEIVER

Air System:

A. Rig air compressor package consisting of the following mounted on a single hut.

i) Two Nos. of Electric motor driven screw air compressors each have a capacity of minimum 90 CFM at 125 psig working pressure, complete with all accessories.

ii) One number Cold Start Compressor having a capacity of minimum30-40 CFM at 150 psig working pressure, driven by a suitable diesel engine (Make: Caterpillar).

iii) Two (2) nos. of Air Receiver hydraulically tested within last three years with documentary evidence each having a capacity of 80 CFT and rated for 200 psig working pressure complete with **Refrigerator Type Air Dryer**, safety relief valve, pressure gauge, condensate trap etc.

B. Two (2) nos. of extra Air Receiver each having a capacity of 80 CFT mounted on a single oilfield type skid complete with SRV & Pressures gages for immediate use in derrick floor to be placed near the entrance of the staircase .

SPECIAL NOTE:

All the components of the Air system other than Item B are to be accommodated in the Power Pack Skids and within the Acoustic Enclosure.

3. SUCTION AND DELIVERY SYSTEM of Slush Pump

a) Suitable length 3.1/2" ID x 5000 psi WP vibrator hose.

b) Suction hose should interconnect Rig Pump #1 and #2 with butterfly valves in between.

c) Cameron or equivalent 5000 psi WP dual stand pipe manifold complete with gate valves, pressure gauge of 5000 psi rating and other standard fittings.

d) 4" OD x 5000 psi WP dual stand pipe of suitable length with ' H ' manifold to match the operating conditions with Range-II drill pipes complete with gooseneck, hammer union or uni-bolt couplings for making up rotary hose with safety clamp attached. It should be designed to suit Kelly or Top Drive.

e) 3.1/2" ID x 60-75 ft long x 5000 psi WP, rotary drilling hoses with suitable connection to make up on to the standpipe and rotary swivel. The length of Rotary hose should suit the rig for drilling operations.

f) Rig pump delivery manifold shall be connected to the vibrator hoses through rigidly supported strainer cross

g) There shall be 5000 Psi working pressure gate valve on each mud delivery manifold.

h) From each pump delivery manifold, suitable bleed line and valve should be provided.

i) Pump delivery manifold shall have arrangements for hole fill-up line and kill line connections of suitable sizes with Gate valves.

j) The 5000 Psi pulsation dampeners on each pump shall be complete with charging valve, pressure gage, hose assembly for charging and any other accessories required.

k) Required length of intermediate 5000 psi WP delivery pipes complete with bend, `T's and valves to connect the pumps (2 Nos.) independently to the stand pipes

l) Necessary anchoring arrangement of all high pressure delivery lines

3. PNEUMATIC WINCH:

One (1) IRI make FA 2.5 A – LXK1G or equivalent Pneumatic Winch with Automatic Disc Brake and standard winch mounted throttle with the following specifications:

- Capacity (Mid-drum line pull): 5000 lbs on drum @ 90 psig
- Mid-drum Line Speed: 135 fpm @ 90 psig
- Max Stall on 1st Layer: 10,400 lbs
- Wire Rope Storage Capacity (full drum): 625 ft of 5/8" line
- Drum length: 20"
- Drum Root Diameter: 9.1/4"
- Avg. Air Consumption: 560 SCFM
- Air Inlet: 1.1/2"
- Motor HP: 25 hp
- Automatic Disc Brake
- Winch mounted single lever throttle for lifting & lowering, spring return to neutral with lift & shift engagement mechanism
- Corrosion resistant paint with thermoplastic coating
- Exhaust muffler
- Air lubricator, strainer
- Air hose – 50 ft x 1.1/2" ID
- Drum guard

4. STANDPIPE MANIFOLD:

One (1) 4" x 5000 PSI WP Standpipe Manifold to connect to standpipe consisting of:

- One (1) 4" x 5000 PSI WP mud gate valve
- One (1) 2" x 5000 PSI WP mud gate valve for kill / fill line
- Two (2) 4" fig 1002 hammer unions
- One (1) 2" connection for pressure gauge with fig 1002 hammer union
- One (1) 2" connection for pressure transducer with API flange
- One (1) suitable pressure gauge 0-6000 psi rating.

5. VIBRATOR HOSE:

Two (2) Vibrator Hoses, 4" API Grade 'D' 5000 PSI WP, 10000 PSI Test Pressure of suitable length (to be specified by the bidder) complete with 4" API male coupling at each end including hose hobble at each end

6. HIGH PRESSURE GROUND MANIFOLD:

One (1) High Pressure Ground Manifold for two (2) mud pumps consisting of:

- Two (2) 4" x 5000 PSI WP mud gate valves

- One (1) long sweep tee
- Two (2) 4" 90 degree long sweep elbows
- Three (3) 4" fig 1002 hammer unions
- One (1) 6 ft x 6 ft base for mounting ground manifold

7. PUMP DELIVERY LINES:
Two (2) 4" Pump Delivery Lines of suitable length with Fig 1002 hammer unions at each end

8. KILL LINE & FILL LINE:
Kill Line kit for field installation consisting of:

- 2" XXS pipe of suitable length (to be specified by the bidder)
- Three (3) 2" x 6000 PSI Style 50 Swivel Joints
- Two (2) 2" Fig 1002 Hammer Unions

Low-pressure Fill Line of suitable length (to be specified by the bidder) with 2" Fig 1002 Hammer Union at each end

9. BELL NIPPLE:
One (1) Bell Nipple, funnel & telescoping style, mounted in the substructure with flange to match BOP flange

10. FLOW LINE:
One (1) 10" to 12" Flow Line from Bell Nipple to Shale Shaker Unit complete with butterfly valves and couplings

11. RATHOLE ASSEMBLY:
One (1) Rathole assembly with digger unit or suitable mechanical device for drilling rat hole and mouse hole complete with suitable size scabbards.

12. MOUSEHOLE SCABBARD ASSEMBLY:
One (1) Mousehole Scabbard Assembly

13. CATWALK ASSEMBLY:
One (1) Two-piece Catwalk Assembly (3.5 ft to 4 ft wide x 40 to 50 ft long x 3.6 ft high) with built-in stair and provision to hinge pipe rack on each side.

14. PIPE RACKS:
One (1) lot of twelve (12) Triangular Pipe Racks, 3.1/2 ft x 3.1/2 ft x 14 ft long, fabricated from Sch 160 pipe, for stacking tubular with suitable provisions to hinge with catwalk assembly.

15. CELLAR PUMP:

A. Gorman Rupp make diaphragm pump of model 4DB or similar pump having same capacity driven by explosion proof electric motor with matching frequency complete with all suction and delivery lines mounted on a 1 feet high suitable oil field type skid, for cellar cleaning purpose. Pump should be suitable for class I, dir. 2 areas and gas group I, IIA & IIB and with Flexible coupling. [Alternately, a suitable cellar ejection system may be offered]
B. Vertical Type Vortex Pump (Make: Flygt)
Model: H 8044 (complete package with control & monitoring data)

16. FUEL TANK & PUMPS:
One (1) 40 KL Capacity Skid Mounted, Cylindrical, Horizontal Diesel Storage Tank fabricated on heavy duty oilfield type skid (length with skid should not exceed 9.0 mtrs.) with standard accessories such

as man ways on top with ladder rungs attached to wall for access into each compartment and rungs on OD for access to top of tank, tank level indicator, etc

The tank should be complete with two (2) nos. of 1" fuel charge pumps & all required fittings for supply of fuel to engines of generators.

17. TOOLS & WRENCHES SET:

One (1) set of tools & wrenches with tool box for following (List of tools & quantities should be furnished in bid document):

1. Draw-Works
2. Mast & Sub-Structure
3. Engine & Transmission
4. Electrical system
5. Mud Pumps
6. Mud system

18. RIG WASHER

2 (Two) nos. of suitable electrically operated (Single Phase 220 V 50 Hz AC power) high pressure portable cleaning pump complete with suitable electric motor, 20 ft long cable & necessary fittings. The pump should have 1" suction port & 40 ft. long delivery hose with nozzle for cleaning the draw-works & mast with water jet.

19. CASING LINE CUTTER

1 (One) no. of manually operated wire line cutter suitable for cutting 1.1/8" & smaller size wire line (casing line).

20. SOUND LEVEL METER & CALIBRATOR

1 (One) no. of portable battery operated Sound Level Meter with Liquid Crystal Display (LCD) providing readings in 0.1 dB increments with 40-130 dBA measurement range. The sound level meter should have low battery indicator, RFI-shielded construction, all required accessories, certified to be intrinsically safe & complete with storage case.

1(One) no. of sound meter Calibrator to verify accuracy of sound meter.

SECTION 11: INSTRUCTIONS / NOTES

1. TRANSPORT DIMENSIONS LIMITATION & DESIGN:

1.0 All major accessories such as Power Control Room, Tanks, Pumps, Gen-sets, etc. shall be mounted on self-loading skid.
2.0 Overall dimensions of all accessories of rig package should preferably not to exceed 9m x 2.5m x 2.5m (Length x Breadth x Height) **unless otherwise stated elsewhere in this tender**.
3.0 The overall weight of single item including skid should not exceed 28 MT.
4.0 For a skid of 2.5m width, there should be at least four longitudinal main sections, preferably each one of single length and should have a smooth finish underneath and curve finish at both the end, so that the skid can roll over the loading roller and body of the truck without any obstruction.
5.0 The skid so designed should be sufficiently strong and properly welded at joints and should be able to withstand any shocks which are bound to come while being handled and transported over rough and slushy roads/locations. Height of the joint used for the longitudinal members should be minimum 20 cm.

2. PAINTING INSTRUCTIONS:

At least 3 coats after applying primer. Under Coating with Anti Corrosive Treatment for cement & rust and polyurethane paint. The preferred color shade should be as under.

MAST	-	WHITE
CROWN	-	RED
DOUBLE BOARD	-	RED
TRUCK & DRAW-WORKS	-	BLUE
ALL HAND RAILS	-	YELLOW
MUD PUMPS	-	BLUE
TRAVELLING BLOCK	-	YELLOW
AIR TANK	-	WHITE
MUD & WATER TANKS	-	GREY
ELECTRICAL CONTROL ROOM	-	WHITE

All operating and warning labels on equipment must be in English

3. SPARE PARTS:

Spares for two years normal operation of carrier, engine, draw-works, mast & sub-structure, mud system, various drilling equipments & electrical system should be included in the offer indicating item, part no. & quantity required year wise. Item wise price of such spares should also be provided in commercial bid. Bidder should indicate the part nos. against each item along with supplier's part no. if any. The cost of spares will not be considered for price comparison. Purchase of these spares will be optional. The price of such spares should not change for next 2 years from the date of quotation. Bidders must confirm the same along with the availability of spares for next 15 years.

4. PARTS CATALOGUE, OPERATION / INSTRUCTION MANUAL & DRAWING, TECHNICAL INFORMATION & BULLETIN:

The bidder should provide at least one set of parts list, operations manual & service manual covering all the items & its accessories including any special / alignment tools for the same along with the technical offer. Technical details of the engine, draw-works, mast & sub-structure, mud system, electrical system with dimensional drawing must also be forwarded along with the technical offer.
The supplier should provide the following information wherever applicable along with the technical offer –

a) Dynamic load
b) Static load
c) Unbalance load
d) Location of centre of gravity.

The catalogue should include

- Weight of each & every major component such as draw-works, mast, engine, sub-structure, etc.
- All principal dimensions, including those required for foundation / skid mounting & maintenance clearance.
- All horizontal & vertical clearance required for assembling & dismantling.

Installation, operation & maintenance manual should cover the following:

- Start up, normal shut down, emergency shut down, operating limits & operational procedures.
- Rig-up & rig-down sequence.
- Technical leaflets with detailed diagram, specification & make of axle, suspension, steering, wheel & rim, brake, etc.
- Detailed dimensional drawing showing construction dimensions with material description of Driver's cabin.
- Layout drawing of all components on the unit with details of load distribution

Foundation & site layout drawings with load bearing capacity / distribution for various components of the rig package covering the following:

- Assumed parameters of design of CC / RCC foundations shall be furnished.
- All design for foundation shall confirm to BIS - 456:2000.
- For Machine Foundation the code to be followed are IS – 2974 & IS – 13301 respectively.

5. MANUALS & CATALOGUES

Supply of 6(six) sets of Spare Parts Catalogue and Workshop & Service Manual for all major components/systems like Carrier, Engines, Draw-works, Mast & Sub-structure, transmission, axles, pneumatic & electrical systems, brake hydraulic system (if any), etc. including it's sub-assemblies complete with all schematics along with the unit.
In addition, supply of 2 (Two) sets catalogue/manual in compact disc.
All manuals & catalogues should be in English.

6. GUARANTEE / WARRANTY

The complete package / unit shall be under guarantee / warranty by the supplier (or the bidder) for a minimum period of 1 (one) year from the date of successful commissioning of the complete unit at site.
OIL reserves the right to inspect, test & if necessary reject any parts / parts after delivery at site (including incomplete manuals, catalogues, etc.) in case of any fault on the part of the supplier. It

shall in no way be waived by the reason that the unit / item was previously inspected & passed by OIL as per Inspection Clause detailed elsewhere in the NIT.
To keep the unit fully operational, in case of failure of any item during the warranty period, it is the supplier's responsibility to arrange replacement / repairing at site at their own cost including custom duty, freight, etc. within a period of maximum 3 (three) weeks from the date of notification of such failure. The warranty for the repaired item shall be correspondently extended by a period equal to that from the date of failure to the date of re-commissioning. In case of replacements, the warranty shall be for 1 (one) year from the date of commissioning of the replaced item.

Note : OIL at its discretion may engage one of the TPI agencies as mentioned below to carry out inspection during manufacturing process and Factory Acceptance Testing (FAT) at manufacturer's plant as per procedure and scope of work followed Internationally by reputed TPI. Bidders are required to confirm categorically their acceptance towards such TPI and confirm to extend all required facilities for TPI at respective plants during various steps of rig manufacturing with no extra charge to OIL. However, the cost of TPI will be borne by OIL.

1. Moduspec, Singapore
2. Aberdeen Drilling Consultant, UK
3. Oil Field Audit & Service Inc. USA
4. ÉMI-TÜV, Budapest

(Broad Scope of inspection, in case of inspection by third party inspection agency has been furnished vide Annexure-3)

7. PRE-DESPATCH INSPECTION

Complete package of self-propelled mobile drilling rig **duly assembled** (& complete with all rig accessories) at manufacturer's yard should be offered for inspection & functional testing by OIL's team (comprising of engineers from Drilling, Chemical, Technical Services, Field Engineering, Instrumentation, Transport & Electrical) prior to dispatch with at least one month notice. Bidder should indicate their acceptance in the technical bid.

The Inspection cum Acceptance process would include but not limited to the following minimum steps/tasks -

1. Physical verification/inspection of all the items/fittings/accessories including all Parts Catalogue, Maintenance & Service Manuals, Schematics, Final Chassis Built Up/Vehicle Content Record documents, all tools under complete tool kit as well as other tools, all spares as per the Spare Parts List for carrier, etc. and **actual loading on axles**. The supplier shall arrange driver/operator, weighing facility and any other infrastructure during the process of inspection as and when required.
2. Operational testing of the carrier, rig engines, draw-works, Electric & lighting system, Rig-up & Rig-down sequence, etc.
3. Supplier shall have to take note of any minor modification(s) for operational requirement suggested by the inspection team and comply with the same at no extra cost.
4. The minutes of inspection process would be prepared at the end of the inspection and jointly signed by both the parties.
5. Supplier shall confirm in writing compliance of all the points raised in the minutes of inspection as well as any other subsequent additions/changes, following deliberation with the inspector after arrival at Duliajan.
6. Supplier will affect dispatch of the unit only on receipt of OIL's dispatch advice.
7. Any other testing / joint inspection indicated elsewhere in this tender.

8. DELIVERY OF THE UNIT

A. IN CASE OF FOREIGN SUPPLIER

(i) The shipment of the unit to **KOLKATA** port, India.

B. IN CASE OF INDIGENOUS SUPPLIER

(i) Safe transportation of the unit from manufacturing plant to OIL, Duliajan will be under the full responsibility of the supplier including arrangement of operator(s) as well as necessary permits, documents, etc.

9. TRAINING

The supplier should arrange comprehensive training programme **immediately after the pre-dispatch inspection** for 1(one) Transport Engineer, 2 (two) Mechanical Engineers (one each from Technical Services & field Engineering), 1 (one) Electrical Engineer, 1 (one) Instrumentation Engineer & 1 (one) Drilling Engineer of OIL at their manufacturing plant / works for a period not more than 2 (two) weeks on Maintenance, Troubleshooting & Working Principle of following system / items in the unit amongst other relevant subjects **[Bidder should indicate the training module with duration in technical bid. Traveling expenses (i.e. from Duliajan, India & back), boarding, lodging & fooding expenses during training) will be on OIL's account.**

For Transport Engineer:

- Power assisted steering system including hydraulic pump and gearbox.
- Pneumatic system for brake & gear shifter (of the carrier) including different valves.
- Axle, brake & suspension systems.

For Mechanical Engineer (Technical Services & field Engineering):

- Power Packs & Generating set Engine System including their adjustments.
- Allison Transmission system
- Hydraulic system
- Pneumatic system
- Mud Pumps & accessories
- Draw-works, Rotary Table, Rotary Swivel & other major rig equipment maintenance

For Electrical Engineer:

- Generating sets
- Power Control
- Power distribution
- Advanced SCR maintenance

For Instrumentation Engineer:

- Training on instrumentation & control system of IC engines
- Electronic digital monitoring system for all the drilling parameters
- Allison Electronic Control system
- Mud watch system including the transducers

- ❖ Training on software for programming and trouble shooting of drilling instrumentation system
- ❖ Pneumatic & hydraulic Control system
- ❖ Report generation, printing & documentation

For Drilling Engineer

- ❖ Draw-works (with maintenance procedures)
- ❖ Hydraulic system
- ❖ Mast & controls
- ❖ Raising & lowering of Mast, Assembling & disassembling of Mast & Sub-structure, Assembling & disassembling of Mast from carrier and packaging & un-packaging of Mast & Sub-structure for transportation purpose.

10. MAKE OF RIG ACCESSORIES

Make of rig major rig accessories for supply with rig package should be as per the following options. Bidder should confirm the make of these items in technical bid accordingly.

Sl. No.	Equipment / Accessories	Make / Name of Vendor	API Specification
1.	Mast & Sub-Structure	Any API licensed vendor	4F
2.	Disc Brake	1. Eaton Corporation 2. National Oilwell Varco 3. Varco Drilling Equipment	-
3.	Draw-works & Rotary Chains	1. Diamond Chain Company 2. Regina Catene Calibrate S.p.A. 3. Rexnord Kette GMBH	7F
4.	Rotary Table	1. American Block Company 2. Bharat Heavy Electricals Ltd 3. Drillmec S.p.A. 4. Hackers Industries 5. National Oilwell Varco 6. Varco BJ	7K
5.	Rotary Swivel	1. American Block Company 2. Bharat Heavy Electricals Ltd 3. National Oilwell Varco 4. Soilmec	8C
6.	Traveling Block & Hook	1. American Block Company 2. Bharat Heavy Electricals Ltd 3. Drillmec S.p.A. 4. National Oilwell Varco	8C
7.	Elevator Links	1. Blohm & Voss GmbH 2. National Oilwell Varco 3. Varco BJ	8C
8.	Dead Line Anchor	1. Dreco Energy Services 2. National Oilwell Varco	8C
9.	Casing / Drilling Line	1. Bridon American Corp. 2. Usha Martin Limited. 3. Wire Rope Corporation of	9A

		America Inc.	
10.	Rotary Hose	1. Dunlop Argentina 2. Phoenix Beattle	7K
11.	Solid Control Equipments (Shale Shakers, Desander, Desilter, Degasser)	1. Derrick Equipment Co. 2. National Oilwell Varco 3. Swaco Norge AS	-
12.	Drilling Instruments & Gauges	1. Martin Decker 2. Can Global 3. Wagner 4. Oteco	-
13.	Mud Pumps	1. National Oilwell Varco 2. GD 3. Drill Mac Or Equivalent	-
14.	Pneumatic Winch	1. Ingersoll Rand International	-
15.	Kelly Spinner	1. National Oilwell Varco 2. Varco BJ	8C
16.	Drill-Pipe Spinner	1. Blohm & Voss GmbH 2. National Oilwell Varco 3. Varco BJ	-
17.	Hydraulic Cathead	1. National Oilwell Varco	-
18.	Alternator (Main Power Pack)	1. KATO 2. Caterpillar 3. Baylor 4. BHEL	-
19.	DC Motors	1. G.E. 2. Baylor 3. BHEL Or Equivalent	-
20.	Generator & SCR Control	1. Ross Hill	-

(Note: The equipment confirming to API specifications must have the API monogram die stamped on the body)

11. GENERAL NOTES (In addition to notes mentioned elsewhere in this tender.)

(a) The 750 HP Mobile Rig package should be brand new, unused, of recent manufacture (not prior to six months from date of issuance of Letter Of Intent) & free from any manufacturing defect. This shall be categorically confirmed by the bidders in their quotations.

(b) Any deviation(s) from the tender specification should be clearly highlighted specifying justification in support of deviation.

(c) Offers shall be complete in all respects and all the items/equipment as specified in the tender must be included in the package. Offers deemed to be incomplete shall be liable for outright rejection. (Bidders may quote additional items / equipment or accessories, other than **Handling Equipment** & **Well Control Equipment,** not covered in this enquiry, if felt necessary for the completeness and efficient operation of the rig package).

(d) The Bidder shall categorically confirm that the compatibility of all equipment offered has been thoroughly scrutinized and verified for smooth and trouble-free operation of the entire package to avoid unwarranted hitches during commissioning.

(e) Quotations shall be accompanied by detailed technical specifications, manufacturer's printed specification sheets, literature, drawings, layout drawings & catalogues as indicated.

(f) Bidders should specifically note the document submission schedule indicated elsewhere (i.e. in sections) including special documents requiring statutory clearances.

(g) All equipment to be supplied with the Rig Package shall be in full conformance to and monogrammed per the respective API Specification as mentioned in the tender viz. API Spec 4F, API Spec 5L, API Spec 7, API Spec 7-1, API Spec 7F, API Spec 7K, API Spec 8C, API Spec 9A, API RP 500 & API RP 13E, etc.

(h) Bidders shall confirm categorically that Installation & Commissioning of the Rig Package with all accessories would be carried out by their competent personnel at OIL's designated drill site, in Duliajan, ASSAM, INDIA.
Bidders should specifically note that commissioning for rig electricals will be in two stages. For details refer Section 9, Chapter V (G) of this document.
Commissioning shall be completed within 2 (two) months from receipt of all the items at site at Duliajan.

(i) Bidders, quoting for any bought out items should forward back-up guarantee IN ORIGINAL from the concerned manufacturer(s) for offering their respective products.

(j) Bidder should confirm in their technical bid that they will provide services on call out basis after the normal warranty & guarantee (as stated elsewhere in this tender) for a period not less than 3 years. The charges for such call out services should be indicated in the commercial bid but will not be considered in evaluation of the tenders.

A check list of technical specification for 750 HP mobile rig package has been furnished vide Annexure-A1

Additional Notes:

1) Payment: Payment shall be released as follows:

i) 80 % of the Rig Package value will be released against supply of rig package against proof of despatch/shipment of the goods.

ii) Remaining 20 % of the Rig Package value along with commissioning charges shall be paid after successful commissioning and acceptance of the rig package by OIL at site.

iii) Training charges will be paid only after successful completion of training.

OIL may consider making 100 % payment of the rig package value towards supply of the rig package against proof of dispatch/shipment provided bidders agree to pay interest @ 1% above prevailing Bank Rate (CC rate) of State Bank of India for 20 % of the rig package value and also submit Bank Guarantee

for the equivalent amount plus interest valid till successful commissioning of rig package at site. This is in addition to the 10 % of the order value towards Performance Security as per the NIT requirement.

2) To ascertain the substantial responsiveness of the bid OIL reserves the right to ask the bidder for clarification in respect of clauses covered under BRC also and such clarifications fulfilling the BRC clauses in toto must be received on or before the deadline given by the company, failing which the offer will be summarily rejected.

3) Oil India Purchase Order No. must be engraved on the body of the item. Bidder must confirm the same categorically in their quotation.

4) The items covered by this enquiry shall be used by Oil India Limited in the PEL/ML areas which are issued/renewed after 01/04/99 and hence Nil Customs Duty during import will be applicable. Indigenous bidder shall be eligible for Deemed Export Benefit against this purchase. Details of Deemed Export are furnished vide Addendum to MM/GLOBAL/E-01/2005 enclosed.

5) **Among others, the bidders must indicate the price of major rig components as specified under different sections for Self-Propelled Mobile Drilling Rig in the format furnished in Annexure A2.**

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Annexure – A1

CHECK LIST OF TECHNICAL SPECIFICATION
FOR 750 HP MOBILE RIG PACKAGE

Essential Technical Parameters		Deviations (if any)	Justification in support of deviation
1.	Does the Horse Power rating of the offered rig meet the specified Horse Power Rating of 750 HP?		
2.	Do both the Carrier Engines have a minimum rated Input Horse Power of 440 HP each at 2100 RPM?		
3.	Have you confirmed and substantiated that the Mobile Rig Package is suitable for operation under the climatic conditions specified in BRC.?		
4.	Does your offer include two (2) triplex mud pumps each rated at 1000 HP and meeting the discharge & pressure ratings specified in the enquiry?		
5.	Does your offer include two (2) power packs with Power Control Rooms, sufficient to meet all load requirements to drive the two (2) mud pumps, solids control equipment, auxiliary motors & lighting system?		
6.	Is the offered Mast, Substructure & Crown Block Assembly manufactured & monogrammed per API Spec 4F and of a Minimum Static Hook Load Capacity of 352,740 lbs with 8 lines strung?		
7.	Does the Wind Load Capacity of the mast meet the minimum specification of 40 mph with full set back & without guy lines?		
8.	Does the offered rig have a minimum depth ranging of 10500 ft with 5” drill pipe?		
9.	Does the capacity of the Substructure meet the minimum specification of Static Rotary Capacity of 230 MT & a Simultaneous Pipe Setback Capacity of 125 MT?		
10.	Is the Minimum Clear Height under rotary beams of the Substructure Assembly 14 feet?		
11.	Is the Overall Width & Ground Clearance of the Carrier and Total (Laden) Weight of the Mobile Rig within that specified in the tender?		
12.	Have you verified that the electrical equipments comply with the requirements specified under BRC?		
13.	Do all electrical equipment such as motors, light fittings, push button stations, plugs & sockets, junction boxes, motor starter, etc used in hazardous area have CMRI certification (UL or equivalent certification from competent authority from the country of origin) and DGMS (India) approval for gas group II A & II B? If so, have you		

Essential Technical Parameters		Deviations (if any)	Justification in support of deviation
	forwarded copies of the same with the bid?		
14.	Does your offer include all items, equipment as specified in the enquiry? Do they conform to the respective API Specification and will bear the official API monogram?		
15.	Have you enclosed copies of all API Specifications including the special requirement of API Spec 4F certificates for last 10 years preceding the bid closing date?		
16.	Have you verified and confirmed compatibility of all equipment included in the package?		
17.	Does your offer indicate technical specifications in detail? Have you enclosed manufacturer's printed specification sheets, literature, drawings, layout drawings & catalogues as requested?		
18.	Have you enclosed duly filled-up & signed checklist & all other required documents as specially indicated under various sections?		
19.	Have you confirmed that Installation & Commissioning of the entire package shall be carried out by your competent personnel, in the event of an order? Have you indicated applicable charges towards the same in commercial bid?		
20.	Do you have the experience of supplying Mobile Rigs / Drilling Rigs to reputed international drilling companies? Have you enclosed a 'Track Record' of such supplies made by you during the last 3 years?		
21.	Have you confirmed to extend a warranty [from the manufacturer(s)] that shall be valid for 12 months from date of commissioning of the items (in the event of an order) that the product supplied will be free from all defects & fault in material, workmanship & manufacture and shall be in full conformity with API specifications?		
22.	Have you highlighted the deviations in the offer, if any, to technical specifications of the tender?		

****

Apart from above Check list, Bidders are also requested to fill up the Check list furnished in individual Section of the tender document.

ANNEXURE – A2

Cost of Major Rig Components

Among others, the bidders must indicate the price of major rig components as specified under different sections for Self-Propelled Mobile Drilling Rig in the following format :

(Prices to be indicated in the Commercial bid only)

Sl. No.	Section	Major components	Quantity (Offered)	Rate (Currency)	Total Cost (Currency)
1	1	CARRIER			
2	2	ENGINE			
3	2	ALLISON TRANSMISSION			
4	3	DRAW WORKS			
5	3	DISC BRAKE			
6	3	MAST & SUBSTRUCTURE			
7	3	LIGHT WORK WELL SERVICING PLATFORM			
8	4	ROTARY TABLE			
9	4	ROTARY SWIVEL			
10	4	TRAVELLING BLOCK & HOOK			
11	4	ELEVATOR LINKS			
12	4	CASING / DRILLING LINE			
13	4	ROTARY HOSE			
14	4	DRILL PIPE SPINNER			
15	4	KELLY SPINNER			
16	4	HYDRAULIC CATHEAD			
17	5	MUD & WATER TANK SYSTEM			
18	5	TRIP TANK			
19	5	PRE-FLUSH TANK			
20	5	LWC TANK			
21	5	SHALE SHAKER			
22	5	DESANDER			
23	5	DESILTER			
24	5	VACUUM DEGASSER			
25	5	“POOR BOY” DEGASSER			
26	7	MUD PUMP			
27	8	ENGINE			
28	9	ALTERNATORS			
29	9	POWER CONTROL ROOM			
30	9	DRILLER’S CONTROL CONSOLE			
31	10	DOG HOUSE			
32	10	AIR COMPRESSOR & RECEIVER			
33	10	SUCTION AND DELIVERY SYSTEM OF SLUSH PUMP			
34	10	PNEUMATIC WINCH			

35	10	STANDPIPE MANIFOLD			
36	10	VIBRATOR HOSE			
37	10	HIGH PRESSURE GROUND MANIFOLD			
38	10	PUMP DELIVERY LINES			
39	10	KILL LINE & FILL LINE			
40	10	BELL NIPPLE			
41	10	FLOW LINE			
42	10	RATHOLE ASSEMBLY			
43	10	MOUSEHOLE SCABBARD ASSEMBLY			
44	10	CATWALK ASSEMBLY			
45	10	PIPE RACKS			
46	10	CELLAR PUMP			
47	10	FUEL TANK & PUMPS			
48	10	RIG WASHER			
49	10	CASING LINE CUTTER			
50	10	SOUND LEVEL METER & CALIBRATOR			
51		BIDDERS MAY QUOTE FOR ANY OTHER COMPONENT NOT INCLUDED ABOVE BUT FORMING PART OF TOTAL COST OF DRILLING RIG AS PROVIDED IN COMMERCIAL BID FORMAT (SUMMARY).			

Annexure-A3

SCOPE OF WORK FOR THIRD-PARTY INSPECTION FOR 750 HP MOBILE DRILLING RIG

Broad Scope of Work:

Supplier / Manufacturer shall be responsible for all operational and documentation formalities required to inspect the Rig.

1. Checking the complete specification of rig package with ordered specifications (including instructions / Notes / DGMS approvals for electrical / electronics equipments, various test certificates, make, etc. as applicable).
2. Verification of purchase documents related to bought out items including but not limited to documents audit, API monogram & PSL verification (wherever applicable), etc.
3. NDT report of critical drilling equipments such as Mast & Sub-Structure, Draw works, Dead Line anchor foundation / sheave, air winch foundation, link, bails, clamps, etc. as applicable.
4. The calibration of critical gauges on the drill floor instrumentation panel, stand pipe manifold, drillers console, mud pumps, load cells etc. as applicable.
5. Calibration of relief valve and same should be tagged with test pressure and test date.
6. Inspection of safety equipment as applicable.
7. Submission of inspection report (in English language only).

The scope of work will be sufficient to ensure the unit is fit for purpose and fully operational and will include, but not necessarily be limited to, the following functions:

Pre-Inspection Check:

Before carrying out tests / detailed inspection, the TPI agency shall perform the following checks:

a) Submission of all documents, datasheets, drawings, test certificates etc. by the rig manufacture.
b) Verification of Bill of materials as per OIL' approved documents.
c) Visual inspection as per OIL's approved drawings.
d) Dimensional check as per OIL's approved drawings.
e) All equipment shall have provision for lifting and double earthing.
f) Nameplate and / or Identity marking on all equipment.

Detailed Scope of Work (for 750 HP Mobile Drilling Rig)

Section No.	Equipment	Inspection Work to be performed
1	Carrier	• Manufacturer's commissioning documentation. • Full functional testing. • Verification of turning radius, ground clearance, dimensions, braking system, electrical system, pneumatic & hydraulic system, etc. • Verification of various parameters, displays, alarm system, etc. • Drive testing with full load at all speeds/gears for at least two hours period.

		• Measurement of temperature, noise, assessment of vibration etc.
2	Engines (Carrier)	• Manufacturer's commissioning documentation. • Verification of make, specifications & features. • Function test of all engines for six hour period. • Verification of load sharing. • Function testing of safety shutoff devices. • Verification of calibrations of various meters and tools that are to be provided along with the Rig Engines. • Measurement of temperature, noise, assessment of vibration etc.
2	Transmission	• Manufacturer's commissioning documentation. • Verification of make, specifications & features. • Function test with full load at all speeds / gears for at least six hour period. • Measurement of temperature, noise, assessment of vibration etc.
3	Draw-works	• Fully function testing at maximum load. • Verification of hoisting capacity. • Verification of lebus grooving & wireline size. • Running traveling block between Crown to drill floor in all speeds for at least twenty operations. • Measurement of temperature, noise, assessment of vibration etc. • Verification of lubrication & cooling system.
3	Disc Brake	• Manufacturer's commissioning documentation. • Examination of unit integrity. • Fully function tested at maximum load during draw-works testing. • Measurement of temperature, noise, vibrations, coolant flow, etc.
3	Driller's Console	• Full functional testing. • Verification of various parameters, displays, alarm system, etc.
3	Mast	• Verification of quality control measures during construction. • Examination of NDT testing. • Close inspection of visual integrity. • Examination & verification of leveling jacks, mast controls, raising system, safety devices & lines. • Raising & lowering the mast for at least six Operations. • 100% Load Test of Mast and Substructure. • Verification of clear height, base width & hook load capacity. • Verification of racking platform's position, dimensions & capacity. • Examination of the crown for structural integrity including operational testing with maximum load on the draw-works. • Verification of Crown Block capacity, no. of sheaves, sheaves dia. & groove, fixation of sheaves and wire runs not obstructed during operation. Note: As well glass type light fittings are to be used in the mast, the telescoping sections shall be designed such that while retracting/extending, the sections do not foul with the fittings

		and sufficient clearance is maintained.
3	Substructure	• Verification of quality control measures during construction. • Examination of NDT testing. • Close Inspection of visual integrity. • Raising and lowering substructure for at least two Operations. • Verification of various dimensions, setback & rotary load capacities. • Verification of dimensions & safety aspects for drill floor, stairs & handrails, etc.
3	Deadline Anchor	• Fully functional testing at maximum load. • Functional testing during draw-works & mast testing.
4	Rotary Table	• Manufacturer's commissioning documentation. • Verification of different parameters including load capacity. • Full function testing at all speeds/gears. • Rotational testing for at least six Hours. • Measurement of temperature, noise, assessment of vibration etc.
4	Swivel	• Verification of specification & features. • Pumping through fluids using the Mud Pumps. • Rotational testing of the swivel for at least six hours.
4	Traveling Block & Hook	• Examination of the traveling block & hook for structural integrity. • Verification of specification & features. • Operational testing with maximum load on the Draw-works. • Function testing of hook lock mechanism and snubber assembly.
4	Drill Pipe Spinner & Kelly Spinner	• Examination of structural integrity. • Verification of specification & features. • Operational testing for at least twenty times.
4	Hydraulic Catheads	• Examination of unit integrity. • Recording of various parameters including line pull, wireline size, hydraulic flow, etc.
5	Mud & Water Tanks system	• Verification of specification, dimensions & capacity. • Witness & recording the hydrostatic test. • Function testing of all the agitators, valves, superchargers, loading pumps, etc.
5	Solid Control Equipments (viz. Shale Shaker, Desander, Desilter, Vacuum Degasser & Poor Boy Degasser)	• Manufacturer's commissioning documentation. • Verification of specification, features, dimensions & capacity. • Function test for all for at least six hours at maximum capacity. • Measurement of noise, assessment of vibration, etc.
6	Instrumentation for carrier	• Full functional testing of all instrumentation system in drivers cabin • Verification of manufacturer's documentation along with spare parts list
6	Instrumentation for engine & transmission	• Full functional testing of all instruments and safety switches connected with Engine, Air Dryer, Air Compressor and Air Receiver. • Full functional testing of Allison Transmission along with diagnostic software, parts catalogue etc.

		• Verification of manufacturer's documentation along with spare parts list
6	Instrumentation for draw-works, mast & sub-structure	• Full functional testing of all instruments and safety switches of drillers console
6	Drilling instruments	• Full functional testing of all instruments connected with monitoring system, mud management system, online gas monitoring system, various recorders
6	Instrumentation for power pack	• Full functional testing of all instruments and safety switches connected with engine and generator
6	Documentation	• Verification of technical documentation including service and operation manuals, physical layout drawings, as built diagrams, spare parts list etc. • Verification of DGMS (India)'s approval for all instrumentation equipment supplied for use in the hazardous area of the rig
7	Mud Pumps	• Manufacturer's commissioning documentation. • Verification of specification & features. • NDT of welded joints on the body of the pumps. • Function Testing of SRVs with verification of relevant certifications. • Function test of mud pumps for six hour period at maximum strokes and pressure.
7	Relief Valve	• Verification of specification. • Certification related to relief valves. • Location.
8	Power Pack (Main Engines)	• Manufacturer's commissioning documentation. • Verification of make, specification & features. • Function test of all engines for six hour period. • Verification of load sharing. • Function testing of safety shutoff devices. • Verification of Acoustic Enclosure performance (i.e. 75 dbA at 1.0 meter from source). • Verification of calibrations of various meters and tools that are to be provided along with the Rig Engines. • Measurement of temperature, noise, assessment of vibration etc.
9	Supply of complete electricals [Chapter I A, General Outline]	• Verification of supply of complete electrical system package, including auxiliary electrical systems for operation of the rig, viz. all electrical motors of the solid control system, rig lighting system, utility system (compressed air, water etc.), cable system including cable trays, boxes & grasshopper/ elevators, earthing system, maintenance and testing facility for rig control system, complete set of spares etc. • Verification of nameplate rating and make/ model of all electrical equipment against ordered specification. Applicable standards to be followed - Approved drawings / Industry best practices / applicable IS code.
9	Rig control system	• Functional tests of all supplied hardware and software including Touch screen(s), PLCs, modules, uploading and downloading of programs etc.

	[Chapter I A: General]	• Control system complete with all necessary software, hardware and remote communication capability • Separate instrument earthing bus • All software, including hardware keys licensed to Oil India Limited. Such Licenses shall not have expiration dates. • Manual bypass mode provided (in case the control system fails) • Verification of fault annunciation on simulated possible faults Applicable standards to be followed - As per relevant standards/ tests of control system manufacturer.
9	Power pack (engine alternator) [Chapter I A]	• 100% load test of all power packs (individually) • Verification of load sharing (all possible power pack combinations) • Testing of safety devices like emergency stops, overspeed trip, LLOP, HAT, HWT etc. in engine and E-stop switches from D'con • Proper foundation bolts and operation • Double earthing provision *Type Test and Routine Test records of alternators as per standards shall be submitted.* Applicable standards to be followed - Alternators shall be mfd. and tested as per IS 13364, Part 2 1992, IEEE Std. 115, NEMA MG-1, or MIL-Std. 705 ANSI C50.12, BS 4999, CSA, C22.2NO.100, IEC 34, API-546
9	Power Control Room (PCR) *Physical parameters* [Chapter I B]	• Physical dimensions and weight as per order/drawing • Suitable for bottom lifting • Oil field type skid mounted • Suitable for heavy rain/humid areas-Check for water ingress/seepage • To be weight balanced at the centre • NDE for lifting lugs and critical areas and wherever welding is done • Surface preparation • High voltage tests • Primary and secondary injection testing • Sufficient working space (min. 1 m in front of panels) Panels- • **Verification of electrical clearances (phase to phase and phase to ground)** • **Verification of electrical creepage distance** • **Checking of tightness of all connections in bus bars and links and supports** • **Checking of terminations for proper crimping and tightening** • **Checking of wiring by ferrule numbers and tracing of wires as per drawing reference** • Checking of hot spots with infra-red thermometer (in load condition) • No. of starters along with spare starters as per order • Each individual panel in the MCC provided with RCD / ELCB for power circuit as well as control circuit

		• IR value test using 1000 V IR tester all around (with all breakers open)- main 600 VAC bus, 415 VAC auxiliary bus, DC bus • Power frequency voltage test for 1 minute • Mechanical operation of all ACBs/ MCCBs/ switches/ doors/ door latches/ locks etc. • Functional testing of all individual panels • Calibration settings of MCCB and trip test • Calibration settings of overload relays • Calibration settings of earth fault leakage detection devices and trip test • Recording of amps reading during commissioning • Calibration results of all meters (initial calibration results may be provided by the manufacturers themselves) • Functional testing of air conditioners • Cooling Capacity (tons) –tonnage and details (type, full redundancy-100%, make, model, mounting etc.) of the air conditioning system as per order • Plug socket cable terminations are of crimped type Applicable standards to be followed - PCR shell and components shall be manufactured as per IS Codes- 513, 613, 694, 1248, 1646, 1897, 1901, 2026, 2062, 2071 (2), 2102, 2147, 2551, 3043, 5578, 6875, 8084, 8623, 10118, 12021, 13118, 13703, 13947 etc. or *their equivalent international standards like IEC, NEMA*, IEC 60947 etc. and conform to Indian Electricity Rules 1956 *Wherever values are mentioned in the order, for example, "SCR blowers should be capable of "X" CFM of air per minute or second", this has to be verified.* *All starters below 55 kW (75HP) should be DOL type. Starters above this shall be provided with a "soft starter", with suitable contactor arrangement*.
9	Generator Panels [Chapter I B (b)]	• Checking of terminations for proper crimping and tightening • Functional testing of each panel including all switches, speed/ voltage adjust pots • Synchronization and load sharing of generators (in all possible combinations) • **Verification of Fault annunciation on simulated faults on alternator/ engine** Applicable standards to be followed - As per approved drawings
9	Thyristor panels [Chapter I B (c)]	• Checking of tightness of all connections in busbars and links and supports • Checking of terminations for proper crimping and tightening • Assignment verification • Functional testing of all panels including all ACBs, MCCBs, switches, meters, indication lamps, logic circuit, adjustment pots etc. • Full load testing from all panels • **Verification of Fault annunciation on simulated faults** Applicable standards to be followed - As per approved drawings
9	Field Supply	• Checking of tightness of all connections, links and supports

	panels [Chapter I B (d)]	• Checking of terminations for proper crimping and tightening • Assignment verification • Functional testing of all panels including all Fuses, MCCBs, switches, meters, indication lamps, etc. • Full load testing from all panels (with thyristor panels) Applicable standards to be followed - As per approved drawings
9	D'con (Driller's control console) [Chapter I B (j)]	• Checking of terminations for proper crimping and tightening • Assignment verification • Verification/functionality tests of all switches, throttles (up to 100%) and meters and annunciation • Functionality test of foot throttle • Supply and functionality testing of pressurization (air purging system) in D'con and foot throttle • Rotary torque current limit verification Applicable standards to be followed - As per approved drawing
9	DC drilling motors [Chapter I C 1 Mud pump Motors]	• Record of insulation testing • Functional testing of pressurization of blower and pressure switch/ relay • Functional testing of all interlocks • Operation testing- full load and single/ double motor in pumps • Load sharing in double motor operation • Foundation bolts (for both main and blower motor) • Double earthing provision (for both main and blower motor) Applicable standards to be followed - NEMA Standard MG1, or equivalent international standards *Type test and routine tests- certificates for both to be submitted*
9	Auxiliary motors [Chapter I C 2]	• Number and type/ rating of motor as per order • Record of insulation testing • Functional testing- no load/ partial load/ full load • DGMS approval supplied Applicable standards to be followed - Manufactured and tested as per IS- 325, 1231, 2148, 3682 *Type test and routine tests- certificates for both to be submitted*
9	Ground fault detection and Neutral grounding system of MPCR and ACPCR [Chapter I B (h)]	• Functional testing of ground fault detection system including audio-visual alarm/ indication (600/415 AC & DC bus) • Functional testing of Variable AC voltage ground detection circuit for AC drilling motors with audio-visual annunciation • Functional testing of and records (including audio/ visual alarm tests) of restricted neutral earth system used in the system designed for maximum earth fault current of 750 milliAmps using NGR • Permanent Insulation monitor provided in the NGR system Applicable standards to be followed - IS-3043, Indian Electricity Rules; Approved drawings
9	Transformers [Chapter I B (k)]	• Name plate rating as per order • Full load testing including temp. rise • Transformer terminations – primary and secondary (Stand off / cable connected in air filled enclosure) • Provision for Star connected secondary with neutral

		terminal available in terminal box (for isolation transformer) Applicable standards to be followed - Standard – Indian standard IS-11171, 2026 or equivalent international NEMA/ IEC *Type test and routine tests- certificates for both to be submitted*
9	Rig Lighting system [Chapter I E, 1]	• Quantity and type of light fittings • All the FLP light fittings DGMS (India) approved. • All light fittings provided with necessary control gears and lamps. • Provision of mast lighting socket board • Lighting voltage (e.g. 240 volt phase to phase in Hazardous areas/ 240 volt phase to neutral for other areas)? • Provision of aviation warning lights– Red colour, continuous glow(night), white colour – flashing(day) as per order • Lighting scheme and details light fittings • All lighting circuits with RCBO/ RCD for current leakage sensitivity of 300 mA Applicable standards to be followed - DGMS (India) approval & as per order specifications.
9	Area and crew cabin illumination system [Chapter I E, 2]	• As per order • Functional testing of all feeders
9	Cables and cable handling system [Chapter I D]	• Cable system suitable for 1+3 cluster drilling • Trays, boxes, grasshopper etc. provided • Type of cable for 3 phase equipment, light fittings, alternators, motors, controls connections- HOFR, EPR insulated, CSP sheathed and copper screened copper conductor, EVA insulated and sheathed copper conductor- as per order • All the cables including power, control, lighting etc. supplied complete with suitable male/female plug/ connectors • Cores identifiable by colour/ number Applicable standards to be followed - DGMS (India) approval & as per order specifications.
9	Rig Earthing system [Chapter I E, 4]	• Earthing scheme along with the electrode layout • Double earthing provision in all equipments. Applicable standards to be followed - IS-1573, 3043
9	Electrical tools and instruments [Chapter I E, 5]	• Calibrated- calibration records by manufacturer submitted • Laptop and desktop computers for control system programming- of latest models Applicable standards to be followed - As per order specifications.
9	Spares [Chapter III]	• As per order quantity, make, model/type Applicable standards to be followed - As per order specifications.
9	DGMS approval for Hazardous equipments [Chapter I C (5), 2, I E (1), various places]	• DGMS (India)'s approval for all electrical equipment supplied for use in the hazardous areas of the rig Applicable standards to be followed - Oil Mines Regulation 1984.

9	Surface finish and painting [Chapter I B]	• All applicable equipment- as per order • Painting/ powder coating thickness verification Applicable standards to be followed - IS-5, 101
10	Rig Air System	• Verification of specification & features. • Full functional testing of system. • Hydraulic Testing of Air Vessels and function testing of SRVs fitted to the Air system. • Function Testing of Air Dryer unit. • NDT of welded joints of Air vessels.
10	Suction & Delivery System (incl. Standpipe & ground Manifold)	• Verification of specification. • Witness & recording the pressure testing (at least 100% of working pressure). • NDT of welded joints & pipes. • Function testing of all the valves.
10	Cellar Pumps	• Full Functional Testing.
10	Pneumatic Winch	• Verification of features & specification including load capacity. • Functional testing at full load. • Operational testing at maximum load for at least 20 times.
10	Fuel System	• Verification of specification & features. • Full functional testing. • Suitability of construction. • Verification of Fuel transfer. • Hydraulic Testing of Fuel Tanks. • NDT of welded joints in the Fuel tanks. • Verification of Calibration Chart / Scale for Fuel Tanks as provided by Manufacturer.

During the performance of the Services the TPI agency / contractor will observe all relevant regulatory requirements and shall comply with Manufacturer's HSE requirements.

TPI agency / Contractor shall have and shall implement a quality system that ensures, a high standard of proficiency is maintained by its personnel and during the performance of the Services. This system shall be documented and auditable records shall be maintained. The system will be subject to Company's approval and Company shall have the right to periodically inspect and audit Contractors places of business, workshops and audit implementation of quality standards.

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ANNEXURE-B

BID REJECTION CRITERIA & BID EVALUATION CRITERIA

(I) BID REJECTION CRITERIA:

The bids shall conform generally to the specifications and terms as well as conditions laid out in the tender. Bids will be rejected in case the items offered do not conform to the required parameters stipulated in the technical specifications and to the respective international/national standards wherever stipulated. Notwithstanding the general conformity of the bids to the stipulated specifications and terms and conditions, the following requirements will have to be met by the bids, without which, the same shall be considered as non-responsive and stand rejected.

(A) TECHNICAL:

1. Mobile Rig Package shall be suitable for operating in OIL's fields in Assam where temperatures range between a minimum of 5 degrees Celsius & a maximum of 41 degrees Celsius with Maximum relative humidity of 100 % at 21 deg Celsius, 95 % at 35 deg Celsius & 70 % at 41 deg Celsius; Avg annual rainfall: 300 cm. This shall be substantiated by the Manufacturer's printed specifications of the respective equipment.

2. The Input Horse Power Rating of the Draw-works of Mobile Rig shall not be less than 750 HP

3. The Carrier shall have two (2) Engines each of which shall have a rated Horse Power not less than 440 HP (net minimum) at 2100 RPM.

4. The Mobile Rig Package shall include two (2) Single Acting Triplex Mud Pumps each rated at 1000 Input Horse Power with a rated discharge of 2440 LPM (640 GPM) at 165 kg / sq cm (2300 PSI). The maximum Discharge Pressure of the Pumps shall be 351 kg / sq cm (5000 PSI)

5. The Rig Package shall be complete with two (2) Power Packs sufficient to drive the two (2) mud pumps, all Solids Control Equipment, all auxiliary motors and lighting system

6. The Mast, Substructure and Crown Block Assemblies shall be manufactured & monogrammed per API Spec 4F, latest edition

7. The Minimum Static Hook Load Capacity of the Mast shall be 352,740 lbs (176 Short Ton) with a 8-line string-up.

8. The Minimum Wind Load Capacity of the Mast with full set back should be 40 miles/hr (64 Km/hr) without guy lines.

9. The Nominal Depth Rating of the Rig shall be a Minimum of 10,500 feet (3,200 metres) with 5" drill pipes of length range 30-31 ft (9.14-9.44 M)

10. The Substructure shall have a Minimum Static Rotary Capacity of 230 MT (507, 000 lbs) & a Simultaneous Pipe Setback Capacity of 125 MT (275,600 lbs)

11. The Substructure shall have a Minimum Clear Height under Rotary Beams of 14 feet.

12. Total Weight (Laden Weight) of the unit with all items including mast shall be within approx. 85% (Eighty Five percent) of maximum Gross Vehicle Weight (i.e. Total Axle Capacity) of the unit.

13. The manufacturers shall have the experience of supplying at least 05 Nos. of 750 HP or higher capacity Mobile Rig packages to reputed international drilling companies / service providers and submit a 'Track Record' of such supplies made during the last 5 years preceding the technical bid closing date.

    Performance Certificates from end users towards at least three (3) rigs out of five mentioned above of same manufacturer to be provided by the bidder.

    Manufacturer should certify to this effect and provide a list of Customers along with the following details together with documentary evidence:

    (a) Customer's Name, Address & Contact Details.
    (b) Supply Order No. & Date.
    (c) Quantity Supplied.
    (d) Invoice No. & Date.

    Experience criteria as above shall not be applicable for manufacturers who has successfully supplied drilling rigs to OIL in past.

14. Bids are invited from manufacturers of rig package or their duly authorized distributors/ dealers/ supply houses. The bidders, other than manufacturers, shall submit original certificate of authorization from the manufacturer for the offered rig package.

    However, the bidders quoting on behalf of the manufacturers must specifically submit undertaking in original from the rig manufacturer for offer & supply of rigs, warranty, back up guarantee, testing facilities, after sale services and uninterrupted supply of spares for at least 10 years.

    The authorized distributors / dealers/ supply houses should quote for the supply of rigs from the manufacturers who meet the experience & other criteria including BRC/BEC requirements mentioned in the bid document.

15. Manufacturer must be a valid licensee of API Spec. 4F for a period not less than 10 years continuously without any break preceding the bid (technical) opening date. Bids from bidders having API Spec 4F license (of Manufacturer) less than 10 years or having a break in between, preceding the bid opening date will not be considered (copies of API certificate for all the 10 years must be forwarded with technical bid).

(B) <u>COMMERCIAL</u> :

1.0 Bids are invited under Single Stage Two Bid System. Bidders shall quote accordingly under Single Stage Two Bid System. **Please note that no price details should be furnished in the Technical (i.e. Unpriced) bid.** The "Unpriced Bid" shall contain all techno-commercial details except the prices which shall be kept blank. The "Priced Bid" must contain the price schedule and the bidder's commercial terms and conditions. Bidder not complying with above submission procedure will be rejected.

2.0 Bid security of US $ 1,18,000 or Rs. 53,00,000 shall be furnished as a part of the TECHNICAL BID. Any bid not accompanied by a proper bid security in ORIGINAL will be rejected without any further consideration. For exemption for submission of Bid Security, please refer Clause No. 9.8(Section A) of General Terms and Conditions for Global Tender. The Bid Security shall be valid for 270 days from the date of bid opening.

3.0 Bidders must confirm that Goods, materials or plant(s) to be supplied shall be new of recent make and of the best quality and workmanship and shall be guaranteed for a period of twelve months from the date of commissioning of the complete package at site against any defects arising from faulty materials, workmanship or design. Defective goods/materials or parts rejected by OIL shall be replaced immediately by the supplier at the supplier's expenses at no extra cost to OIL.

4.0 Successful bidder will be required to furnish a Performance Bank Guarantee @10% of the order value. The Performance Bank Guarantee must be valid for one year from the date of successful commissioning of the complete package at site. Bidder must confirm the same in their Technical Bid. Offers not complying with this clause will be rejected.

5.0 The prices offered will have to be firm through delivery and not subject to variation on any account. A bid submitted with an adjustable price will be treated as non-responsive and rejected.

6.0 Validity of the bid shall be minimum 180 days. Bids with lesser validity will be rejected.

7.0 Bids received after the bid closing date and time will be rejected. Similarly, modifications to bids received after the bid closing date & time will not be considered.

8.0 Bidders shall quote directly and not through Agents in India. Offers made by Indian Agents on behalf of their foreign principals will be rejected. Similarly offers from unsolicited bidders will be rejected.

9.0 Bids containing incorrect statement will be rejected.

10.0 Offers received without Integrity Pact duly signed by the authorised signatory of the bidder will be rejected.

11.0 No offers should be sent by Telex, Cable, E-mail or Fax. Such offers will not be accepted.

12.0 Bidders are required to submit the summary of the prices in their commercial bids as per bid format (Summary), given below :

(i) Commercial Bid Format (SUMMARY) for Foreign Bidders :

(A) Total material cost of Drilling Rig (other than Sl. No. B to H below)
(B) Cost of Spares for Carrier(refer Srl No. 21.0 of Section 1)
(C) Cost of Spares for Engine & Transmission(refer Srl No. 23 of Section 2)
(D) Cost of Tool Kit for Engine & Transmission(refer Srl No. 24 of Section 2)
(E) Cost of Spares for Section 3 & Section 4(refer Srl No. 10 of Section 4)
(F) Cost of Tools & Spares for Section 5 (refer Srl No. 11 of Section 5)
(G) Cost of mandatory Spares for Rig Electricals (refer Chapter III of Section 9)
(H) Cost of Commissioning spares, if any
(I) Grand Total Material Cost, (A + B + C + D + E + F + G + H)
(J) Packing & FOB Charges
(K) Total FOB Port of Shipment value, (I + J) above

(L) Ocean Freight Charges upto Kolkata, India
(M) Insurance Charges
(N) Total CIF Kolkata value, (K + L + M)
(O) Pre-shipment Inspection charges, if any as per Clause 7 of Section 11
(P) Training charges, if any as per Clause 9 of Section 11
(Q) Installation & Commissioning charges
(R) Total Value, (N + O + P + Q) above
(S) Total value in words :
(T) Gross Weight :
(U) Gross Volume :

(ii) <u>Commercial Bid Format (SUMMARY) for Indigenous Bidders</u> :

(A) Total material cost of Drilling Rig (other than Sl. No. B to H below)
(B) Cost of Spares for Carrier(refer Srl No. 21.0 of Section 1)
(C) Cost of Spares for Engine & Transmission(refer Srl No. 23 of Section 2)
(D) Cost of Tool Kit for Engine & Transmission(refer Srl No. 24 of Section 2)
(E) Cost of Spares for Section 3 & Section 4(refer Srl No. 10 of Section 4)
(F) Cost of Tools & Spares for Section 5 (refer Srl No. 11 of Section 5)
(G) Cost of mandatory Spares for Rig Electricals (refer Chapter III of Section 9)
(H) Cost of Commissioning spares, if any
(I) Grand Total Material Cost, (A + B + C + D + E + F + G + H)
(J) Packing and Forwarding Charges
(K) Total Ex-works value, (I + J) above
(L) Excise Duty including Cess, (Please indicate applicable rate of Duty & Cess)
(M) Sales Tax, (Please indicate applicable rate of Tax)
(N) Total FOR Despatching station price, (K + L + M) above
(O) Road Transportation charges to Duliajan
(P) Insurance Charges
(Q) Total FOR Duliajan value, (N + O + P) above
(R) Pre-despatch Inspection charges, if any as per Clause 7 of Section 11
(S) Training charges, if any as per Clause 9 of Section 11
(T) Installation & Commissioning charges
(U) Total Value, (Q + R + S + T) above
(V) Total value in words :
(W) Gross Weight :
(X) Gross Volume :

<u>NOTES</u> :

1. The Commissioning Spares should be quoted separately indicating the unit price and quantity quoted.

2. The Drilling Rig package covered under this enquiry will be used by OIL in the PEL/ML areas issued/renewed after 01/04/99, applicable Customs Duty for import of goods shall be ZERO. Indigenous bidders shall be eligible for Deemed Export and should quote Deemed Export prices. Excise Duty under Deemed Export exempted.

3. Installation/Commissioning charges must be quoted separately on lumpsum basis which shall be considered for evaluation of the offers. These charges should include amongst others to and fro fares, boarding/lodging, local transport at Duliajan and other expenses of supplier's

commissioning personnel during their stay at Duliajan, Assam(India). All Income, Service, Corporate Taxes etc. towards the services provided under installation / commissioning shall be borne by the supplier and will be deducted at source at the time of releasing the payment. Bidder should also confirm about providing all these services in the Technical Bid.

4. Successful bidder shall offer the Rig Package for Pre-despatch/shipment Inspection by OIL's team of technical/commercial executives. Pre-despatch/Shipment Inspection and Training charges, if any, must be quoted separately on lumpsum basis which shall be considered for evaluation of the offers. The to and fro fares, boarding/lodging and other enroute expenses of OIL's Engineers shall be borne by OIL.

Bidders must categorically indicate the Installation / Commissioning, Pre-despatch/Shipment Inspection and Training charges in their offers and must confirm about providing the same in their Technical bids.

(II) BID EVALUATION CRITERIA :

The bids conforming to the specifications, terms and conditions stipulated in the enquiry and considered to be responsive after subjecting to the Bid Rejection Criteria will be considered for further evaluation as per the Bid Evaluation Criteria given below:

A. COMMERCIAL :

1.0 The evaluation of bids will be done as per the Price Schedule (SUMMARY) detailed vide Para 12.0 of BRC.

2.0 If there is any discrepancy between the unit price and the total price, the unit price will prevail and the total price shall be corrected. Similarly, if there is any discrepancy between words and figure, the amounts in words shall prevail and will be adopted for evaluation.

3.0 For conversion of foreign currency into Indian currency, B.C. selling (Market) rate declared by State Bank of India, one day prior to the date of price bid opening shall be considered. However, if the time lag between the opening of the bids and final decision exceed 3(three) months, then B.C. Selling(Market) rate of exchange declared by SBI on the date prior to the date of final decision shall be adopted for conversion and evaluation.

4.0 Offers not complying with the payment terms indicated in the enquiry shall be loaded with one percent above the prevailing Bank rate (CC rate) of State Bank of India for duration of commissioning time indicated in the tender plus transit time (3 months) for evaluation purpose.

5.0 To ascertain the inter-se-ranking, the comparison of the responsive bids will be made as under, subject to corrections / adjustments given herein.

5.1 **When only foreign bidders are involved :**

Comparison of bids will be done on the basis of "TOTAL VALUE" which is estimated as under :

(A) Total material cost of Drilling Rig (other than Sl. No. B to H below)

(B) Cost of Spares for Carrier(refer Srl No. 21.0 of Section 1)
(C) Cost of Spares for Engine & Transmission(refer Srl No. 23 of Section 2)
(D) Cost of Tool Kit for Engine & Transmission(refer Srl No. 24 of Section 2)
(E) Cost of Spares for Section 3 & Section 4(refer Srl No. 10 of Section 4)
(F) Cost of Tools & Spares for Section 5 (refer Srl No. 11 of Section 5)
(G) Cost of mandatory Spares for Rig Electricals (refer Chapter III of Section 9)
(H) Cost of Commissioning spares, if any
(I) Grand Total Material Cost, (A + B + C + D + E + F + G + H)
(J) Packing & FOB Charges
(K) Total FOB Port of Shipment value, (I + J) above
(L) Ocean Freight Charges upto Kolkata, India
(M) Insurance Charges @ 1% of Total FOB Value vide (K) above
(N) Banking Charges @ 0.5% of Total FOB Value vide (K) above in case of payment through Letter of Credit (If confirmed L/C at buyer's account is required, 1.5% of Total FOB Value will be loaded)
(O) Total CIF Kolkata Value, (K + L + M + N) above
(P) Pre-shipment Inspection charges, if any as per Clause 7 of Section 11
(Q) Training charges, if any as per Clause 9 of Section 11
(R) Installation & Commissioning charges
(S) Total Value, (O + P + Q + R) above

NOTE : Banking charge in the country of the foreign bidder shall be borne by the bidder.

5.2 **When only domestic bidders are involved or when more than one domestic bidders are in contention in case of mixed response :**

Comparison of bids will be done on the basis of "Total Value" which is estimated as under :

(A) Total material cost of Drilling Rig (other than Sl. No. B to H below)
(B) Cost of Spares for Carrier(refer Srl No. 21.0 of Section 1)
(C) Cost of Spares for Engine & Transmission(refer Srl No. 23 of Section 2)
(D) Cost of Tool Kit for Engine & Transmission(refer Srl No. 24 of Section 2)
(E) Cost of Spares for Section 3 & Section 4(refer Srl No. 10 of Section 4)
(F) Cost of Tools & Spares for Section 5 (refer Srl No. 11 of Section 5)
(G) Cost of mandatory Spares for Rig Electricals (refer Chapter III of Section 9)
(H) Cost of Commissioning spares, if any
(I) Grand Total Material Cost, (A + B + C + D + E + F + G + H)
(J) Packing and Forwarding Charges
(K) Total Ex-works value, (I + J) above
(L) Excise Duty including Cess
(M) Sales Tax
(N) Total FOR Despatching station price, (K + L + M) above
(O) Road Transportation charges to Duliajan
(P) Insurance Charges @0.5% of Total FOR Despatching Station Value (N) above
(Q) Total FOR Duliajan value, (N + O + P) above
(R) Pre-despatch Inspection charges, if any as per Clause 7 of Section 11
(S) Training charges, if any as per Clause 9 of Section 11
(T) Installation & Commissioning charges
(U) Total Value, (Q + R + S + T) above

(V) Total value in words :
(W) Gross Weight :
(X) Gross Volume :

NOTE: **Excise Duty in case of the indigenous bidder is EXEMPTED**

5.3 **When both foreign and domestic bidders are involved :**

The Total Value of domestic bidder (inclusive of customs duty on imported raw material and components etc, and applicable terminal excise duty on the finished products and Sales Tax) excluding inland transportation to destination and Insurance charges worked out as per Para 5.2 above and Total Value of the foreign bidder worked out as per Para 5.1 above excluding inland transportation to destination will be compared. No price preference will be allowed to indigenous bidders except that for capital goods, the domestic manufacturers would be accorded a price preference to offset CST to the extent of 4 % or actuals, which ever is less subject to 30 % local content norms as stipulated for World Bank Funded project to the satisfaction of OIL. When more than one domestic bidders fall within price preference range, inter-se-ranking will be done on Total Value basis.

Note: If the Government of India revises these evaluation criteria the same as applicable on the bid closing date will be adopted for evaluation of the offers.

6.0 Other terms and conditions of the enquiry shall be as per General Terms and Conditions for Global Tender. However, if any of the Clauses of the Bid Rejection Criteria / Bid Evaluation Criteria (BEC / BRC) mentioned here contradict the Clauses in the General Terms & Conditions of Global Tender of the tender and/or elsewhere, those mentioned in this BEC / BRC shall prevail.

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ANNEXURE C
TO TENDER NO. SDG9009P11/07

COMMERCIAL CHECK LIST

THE CHECK LIST MUST BE COMPLETED AND RETURNED WITH YOUR OFFER. PLEASE ENSURE THAT ALL THESE POINTS ARE COVERED IN YOUR OFFER. THESE WILL ENSURE THAT YOUR OFFER IS PROPERLY EVALUATED. PLEASE MARK 'YES' OR 'NO' TO THE FOLLOWING QUESTIONS, IN THE RIGHT HAND COLUMN.

1	Whether quoted as manufacturer ?	
2	Whether quoted as Supply House / Distributor / Dealer. To Specify :	
3	If quoted as Supply House / Distributor / Dealer :	
	(a) Whether submitted valid and proper authorization letter from manufacturer in **ORIGINAL** confirming that bidder is their authorized Supply House for the product offered ?	
	(b) Whether manufacturer's back-up Warranty/Guarantee certificate in **ORIGINAL** submitted	
4	Whether bid submitted under Two Bid System ?	
5	Whether **ORIGINAL** Bid Bond (not copy of Bid Bond) submitted? If YES, provide details	
	(a) Amount :	
	(b) Name of issuing Bank :	
	(c) Address of the Bank with Fax no., Email address,etc.	
	(d) Validity of Bid Bond :	
6	Whether agreed to the NIT Warranty clause ?	
7	Whether confirmed to submit PBG as asked for in NIT ?	
8	Whether agreed to submit PBG within 30 days of placement of order ?	

9	Whether offered firm prices through delivery period ?	
10	Whether quoted offer validity of six months from the date of closing of tenders ?	
11	Integrity Pact has been signed and submitted along with the offer.	
12	Whether Price Bid submitted as per Price Schedule (refer Para 12.0 of BRC vide Annexure – B)	
13	Whether Price Break up of the Spares & Tools mentioned in the Price Schedule has been furnished ?	
14	Whether Price Break up of the Major Rig components has been furnished as per Annexure-A2 ?	
15	Whether quoted all the items of tender ?	
16	Whether technical literature / catalogue enclosed?	
17	Whether quoted a firm delivery period?	
18	Whether indicated the country of origin for the items quoted?	
19	Whether quoted as per NIT (without any deviations) ?	
20	Whether quoted any deviation ?	
21	Whether deviation separately highlighted ?	
22	Whether the Recommended Spares for 2 years of operations quoted?	
23	Whether prices quoted for spares for 2 years of operation is valid of two years from the date of quotation as per tender ?	
24	Whether confirmed that all spares & consumables will be supplied for a minimum period of 15 years?	
25	Whether confirmed that in the event of inspection by Third Party inspection agency, all required facilties for third party inspection will be provided by you at no extra cost?	
26	Whether confirmed that Pre-despatch/shipment inspection & testing of the Rig Package will be carried out?	
27	Whether charges towards Pre-despatch/shipment inspection & testing of the Rig Package applicable?	
28	If Pre-despatch/shipment inspection & testing charges applicable, whether quoted separately?	

29	Whether confirmed that Training will be provided in the event of placement of order?	
30	Whether the cost of Training has been furnished in the offer?	
31	Whether to & fro air fares, boarding/lodging of the Training personnel for providing Training at Duliajan, Assam (India) included in the quoted charges ?	
32	Whether confirmed that all Service, Income, Corporate tax etc. towards Services provided under Training are included in the prices quoted ?	
33	Whether confirmed to carry out installation & Commissioning at Duliajan (Assam)?	
34	Whether installation & Commissioning charges applicable?	
35	If installation & Commissioning charges applicable, whether separately quoted on lump sum basis?	
36	Whether to & fro air fares, boarding/lodging of the commissioning personnel for installation & commissioning at Duliajan, Assam (India) included in the quoted charges ?	
37	Whether confirmed that all Service, Income, Corporate tax etc. applicable under installation & Commissioning are included in the prices quoted?	
38	Whether confirmed acceptance of tender Payment Terms of 80% against shipment/dispatch documents and balance 20% alongwith commissioning charges after successful installation & commissioning ?	
39	For Foreign Bidders - Whether offered FOB / FCA port of despatch including sea / air worthy packing & forwarding?	
40	For Foreign Bidders – Whether port of shipment indicated. To specify:	
41	Whether Indian Agent applicable ?	
42	If YES, whether following details of Indian Agent provided ?	
	(a) Name & address of the agent in India – To indicate	
	(b) Amount of agency commission – (Percentage may be indicated)	
	(c) Whether agency commission included in quoted material value?	

43	For Indian bidders – Whether indicated the place from where the goods will be dispatched. To specify :	
44	For Indian bidders – Whether road transportation charges up to Duliajan quoted ?	
45	For Indian Bidders only - Whether offered Ex-works price including packing/forwarding charges ?	
46	For Indian Bidders only - Whether indicated import content in the offer ?	
47	For Indian Bidders only - Whether deemed export quoted?	
48	For Indian Bidders only – Whether all applicable Taxes & Duties have been quoted ?	
49	Whether weight & volume of items offered indicated ?	
50	Whether all BRC/BEC clauses accepted ?	

OFFER REF	

NAME OF THE BIDDER	